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Terrorists versus the Government

STRATEGIC INTERACTION, SUPPORT, AND SPONSORSHIP

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This article focuses on the strategic interaction between a terrorist group and a government as both vie for grassroots support. When terrorists and the government act contemporaneously, the equilibrium outcome depends on the effectiveness of the government's countermeasures and the ability of the government to curb popular support of the terrorists through public spending. In two alternative scenarios, the authors establish that leadership may improve both adversaries' well-being while reducing terrorism. The leader changes in the two cases, with the weaker player going first to the advantage of both players. State sponsorship and franchising of terrorists augment violence as both adversaries expend more effort. Sponsors can offset some strategic limits to violence that competition for supporters offers.

Keywords: noncooperative game; leader-follower; terrorism; counterterrorism; state sponsorship

Since the modern epoch of transnational terrorism beginning in 1968, terrorist groups have come and gone, with the overwhelming majority lasting less than a year (Hoffman 1998). Why has the Palestine Liberation Organization (PLO) endured for decades, while the Combatant Communist Cells (CCC) in Belgium lasted from just October 1984 to December 1985? The contention of this article is that at least three factors play a role: the responsiveness of grassroots supporters, the effectiveness of the government's counterterrorism campaign, and the terrorist group's ability to attract outside sponsorship. Without outside sponsorship, terrorist organizations must gain the active backing of a base of supporters in the population while simultaneously fending off government actions to limit the organizations' effectiveness. This grassroots support takes the form of contributions and political allegiance.

Targeted governments also face a dilemma: they can apply stringent counterterrorism policy (i.e., the stick) or more accommodative actions (i.e., the carrot) to

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reduce the terrorists' base of support (Frey 2004). Rigorous counterterrorism may not only sow the seeds of discontent through callous actions (e.g., the French execution of two Front de Libération National terrorists in Algeria in 1956 [Hoffman 1998, 61]) but also divert funds from social programs that may assist potential terrorist supporters. The latter diversion is especially worrisome because these as-yet uncommitted individuals may then be won over by the terrorists. In cases where social services are inadequate, the terrorists can seize an opportunity to win over supporters (Berman 2003). If, however, the government does not take counterterrorism actions, then the terrorists can operate with impunity until the costs to the government of not conceding to terrorist demands outweigh the benefits of holding firm.

Given their options, the terrorists and the government face not only a test of wills over who will gain the upper hand in a nonconventional conflict but also a competition over who will win over a base of potential supporters. The latter offers financial resources and loyalty to the side with the most attractive actions and political agenda. Although the literature on insurgencies and civil wars, on occasion, includes the role of potential supporters in formal models (e.g., Azam 2002; Grossman 1995; Mason 1996), terrorism models traditionally ignore the essential position of grassroots supporters. Even the nontechnical literature often leaves out the contest for supporters waged by the government and terrorists—for example, DeNardo (1985) views political-fringe groups as resorting to terrorism to overcome their small numbers and inability to mobilize popular support.

When a contest between the government and the terrorist group is depicted in the literature, this contest is over something other than the base of potential supporters. For example, the contest can be over the distribution of rents (Kirk 1983), the fate of hostages (Lapan and Sandler 1988; Selten 1988), the securing of concessions (Bueno de Mesquita 2005a; Kydd and Walter 2002), or the effectiveness of countermeasures (Enders and Sandler 1993). The primary purpose here is to fill this void by characterizing the competition for popular support between a terrorist organization and a government.¹ We also seek answers to other questions, such as the role of adversarial leadership and terrorist sponsorship. Since the late 1970s, sponsorship has been a key issue in terrorism. This sponsorship can take at least three forms: Diaspora support (e.g., funding for the Tamil Tigers in Sri Lanka and the Irish Republican Army in Northern Ireland), state sponsorship (e.g., Libya's support of the downing of Pan Am flight 103), and outside financing (e.g., al-Qaida franchising of terrorist groups) (Byman et al. 2001).

We begin by incorporating various assumptions about the relative strengths of adversarial interests. At the outset, we assume that the government and terrorist group

1. Our analysis differs from that of Rosendorff and Sandler (2004), who investigate how heavy-handed actions of a government may lead to terrorist recruitment and large-scale events. This theme of government-induced radicalism also characterizes de Figueiredo and Weingast (2001), where moderate terrorist supporters are incited to violence by harsh antiterrorism measures. We are interested here in support and sponsorship rather than recruitment of operatives, which is also why our analysis is different from Bueno de Mesquita (2005b). The latter interesting article addresses why terrorist operatives are educated (owing to screening) and why economic downturns may augment the level of terrorism. Our analysis also differs from some of the literature (e.g., Kydd and Walter 2002; Bueno de Mesquita 2005a) because we do not divide the terrorists into extreme and moderate camps.

move simultaneously without the knowledge of their opponent's activity level. We then use the resulting equilibrium to ascertain whether one of these adversaries may profit by costlessly precommitting to an action. Two scenarios are identified. In the first, the terrorist group prefers to scale back operations when seizing the initiative owing to a fickle support base, whose allegiance decreases with a government's offensive. The terrorists' initiative to curb their campaign protects them from being overwhelmed by effective countermeasures. In the second scenario, the terrorist group prefers to move after government countermeasures foster grassroots support for the group by those who react negatively to the government's neglect of their interests. Governmental countermeasures increase popular support for the terrorists by keeping a segment of the population impoverished as social programs are either curtailed or put out of reach. This scenario characterizes the Palestinian situation and the ability of Hamas to build up popular support by providing social services and attacking the alleged oppressors (Hilsenrath 2005). Israeli counterterrorism measures, which eventually closed off Israel to many Palestinian workers, limited labor-associated health care benefits and other public services (e.g., public transport) for Palestinians (Berman 2003; Hilsenrath 2005). As such, the Israeli government *effectively traded off* antiterrorist actions for public goods, thereby leaving an opening for others to provide these goods. Another instance is southern Lebanon, where Hezbollah has gained grassroots support among a neglected constituency. Despite the bolstering of terrorist support, a government may be willing to preempt the terrorists because such actions avoid even greater losses associated with the terrorists seizing the initiative.

The two scenarios indicate that strategic precommitment by an adversary curbs terrorist activities. Nevertheless, the terrorist group gains because it can better adjust its militant campaign based on resources garnered from supporters. An outside party, bent on more militant action, will be disappointed by the potentially low level of hostility. If the outside sponsor can command and direct resources to the terrorist group, then the financier can limit the moderation in violence that stems from efforts to win popular support and exercise strategic precommitment. Thus, al-Qaida's actions to franchise new groups and to bolster old ones (e.g., Abu Sayyaf in the Philippines) serve an insidious purpose by curtailing inherent checks on violence.

The body of this article contains four sections. The first section presents the model in terms of its three agents: the terrorists' support base, the terrorist group (or its leader), and the government. In the next section, we investigate gains from leadership by the terrorist group and the government under two alternative assumptions about the tolerance of the terrorists' support base for government neglect. The third section introduces a fourth player—a financier or sponsor of the terrorist group. Concluding remarks follow in the final section.

STRATEGIC PLAYERS: SUPPORT BASE, TERRORIST GROUP, AND THE GOVERNMENT

Each of the three elements is presented in a simple form. Both the terrorist group and the government try to capture the loyalty of a larger proportion of a potential

pool of supporters, who are assumed to be risk neutral. The timing of the game is as follows: in the first stage of the game, the government and the terrorist group act simultaneously while taking the best response of their counterpart as given. The government chooses the amount of public services and the level of counterterrorism, while the terrorists determine the magnitude of their campaign and the consumption of a good (unrelated to terrorism). In the second stage of the game, the potential pool of supporters decides its allegiance to a side while taking the first-stage equilibrium activity levels of the two adversaries as given. We use backward induction to ascertain the subgame perfect equilibrium by first finding the partition of supporters and then determining the first-stage choices of the government and terrorists.

THE POTENTIAL SUPPORT FOR TERRORISM

We let p denote the total number of potential supporters of the terrorist group. These supporters are uniformly indexed by δ on the unit interval $[0,1]$, where individuals who actively support the group display a higher index number than nonsupporters. An active supporter gains a net payoff, H , from the expected payoffs associated with the terrorist group's success or failure and the supporter's preference for the group (denoted by δ) and loses his or her fixed contribution of σ to the terrorists. We denote the probability that the terrorist group fails (succeeds) in meeting its goals as π ($1-\pi$). Moreover, the terrorist supporter obtains $h(a; s)$ from a terrorist success, s , and $h(a; f)$ from a terrorist failure, f , where variable a denotes the terrorists' level of action. Active supporters of terrorism not only care about the group's success but also about its militancy. These actions also place greater costs on the targeted government. A more sustained terrorist campaign may assuage supporters' anger from either frustration or being ignored. Greater terrorist actions may raise the payoff from success. Obviously, $h(a; f) < h(a; s)$. We also assume that the marginal gain from success exceeds the marginal gain associated with failure, so that $h_a(a; f) < h_a(a; s)$. Moreover, payoff function h is assumed to be strictly increasing and strictly concave in a , so that payoffs display diminishing returns. Terrorist supporters benefit to some extent from government spending, g , on public goods, intended for nonsupporters of the terrorists. Owing to imperfect exclusion, terrorist supporters gain $\theta \bar{b}(g)$ where $\bar{b}(g)$ is increasing and concave in g , and $\theta \in (0,1)$ represents the degree to which government spending benefits terrorist supporters. The government keeps θ smaller than 1 by limiting the supply of g to areas where terrorists are known to hide or train. Another reason for $\theta < 1$ is that some terrorist supporters view government-provided goods as tainted and refuse to partake.

The supporters' payoff function equals

$$H(e,a) = \pi(e,a)h(a;f) + [1-\pi(e,a)]h(a;s) + \theta \bar{b}(g) + \delta - \sigma, \quad (1)$$

where e represents the counterterrorist action of the government, which increases the terrorists' likelihood of failure, $\pi_e > 0$. In contrast, terrorist efforts serve to decrease the terrorists' likelihood of failure, $\pi_e < 0$. We also assume that $\pi_{ee} < 0$, $\pi_{aa} > 0$, and

$\pi_{ea} > 0$. Thus, the failure probability is strictly concave in e and strictly convex in a . The assumed sign of π_{ea} reflects the technology of conflict that exists between the adversaries as well as the government’s advantage over the terrorists: increased action by the terrorists raises the ability of the government to increase terrorists’ failure as they expose themselves to greater risk and governmental scrutiny. The inability of terrorists to increase operations without risking greater jeopardy from counterterrorism reflects the view of terrorism as asymmetric warfare, where a weak opponent gains an advantage by remaining hidden (White 2003, 286). Greater terrorist activity exposes not only operatives but also infrastructure.

For those who opt *not* to support the terrorists, we represent their preferences by²

$$B(g) = \bar{b}(g) + (1-\delta), \tag{2}$$

where \bar{b} reflects expenditure on public projects that benefits those who do not actively support the terrorist group. Our normalization of the coefficient of \bar{b} to equal 1 is consistent with the government’s actions to reduce supplies of g to terrorist-ridden areas, so that nonsupporters gain *relative* to supporters. In (2), those individuals with a higher δ (i.e., a greater allegiance to the terrorists) receive less utility when withholding their active support for the terrorists.

Let $\hat{\delta}$ represent the potential supporter who is indifferent from actively supporting the terrorist group and not supporting it. To find $\hat{\delta}$, we equate (1) and (2) and solve

$$\hat{\delta} = \frac{b(g) - \pi(e, a)h(a; f) - [1 - \pi(e, a)]h(a; s) + 1 + \sigma}{2}, \tag{3}$$

where $b(g) = (1-\theta)\bar{b}(g)$ represents non-supporter-specific public goods gains, not received by terrorist supporters due to imperfect exclusion. Equation (3) determines the equilibrium level of support for the terrorist group for given values of a , g , and e . Thus, those individuals with a δ greater than $\hat{\delta}$ will support the group, while those with a δ smaller than $\hat{\delta}$ will not.

To determine the impact of changes in terrorist and government activity on the terrorist support base, as reflected by the indifferent supporter, we must first specify the relationship between the two variables under direct control of the government (i.e., g and e). This is given by the government’s budget constraint, $g + \alpha e = \beta$, where α represents the per unit costs of government effort directed against the terrorist group, and β represents the (fixed) budgeted amount of money allocated to countering terrorism. Our model acknowledges that g may curb terrorism by helping the welfare of those who may be swayed by the terrorists’ political agenda. After solving the constraint for

2. Our specification assumes that the terrorist group lures supporters with increased terrorist activity rather than through coercion, in the form of retribution for a nonsupporter. Furthermore, we assume that nonsupporters of the terrorists do not free ride on terrorist activities. If, however, we were to allow for nonsupporter free riding, then this would reduce terrorist support levels. Less grassroots support enhances terrorists’ need for outside sponsorship. To simplify the exposition, we ignore the imperfect excludability of terrorist actions. Also, we believe that most nonsupporters do not gain from violence that could be directed at them.

g and substituting the result in (3), we perform comparative statics and obtain the following results:

$$\frac{\partial \hat{\delta}}{\partial a} = -\frac{1}{2} \{ \pi_a [h(f) - h(s)] + \pi h_a(f) + (1 - \pi) h_a(s) \} < 0, \quad (4)$$

$$\frac{\partial \hat{\delta}}{\partial e} = -\frac{1}{2} \{ \alpha b' + \pi_e [h(f) - h(s)] \} \geq 0, \quad (5)$$

where we henceforth suppress a in $h(a; f)$, $h(a; s)$, and $h_a(\cdot)$. Associated second-order partials of $\hat{\delta}$ necessary for subsequent results, are gathered in Appendix A.

Equation (4) shows that increased terrorist activity, a , augments the terrorist group's support by lowering the threshold that makes a potential supporter indifferent between fostering and not fostering the group's efforts. Given our assumptions, the sign of $\partial \hat{\delta} / \partial e$ is ambiguous. If, however, $\alpha b' > -\pi_e [h(f) - h(s)]$, then $\partial \hat{\delta} / \partial e < 0$. That is, the impact of a change in e (via a reduction in government social spending) for those who do not actively support the terrorist group *exceeds* the counterterrorism influence of e on terrorist failure. Hence, by expending more effort to increase the likelihood of a terrorist failure, the government reduces spending on nurturing its political base of terrorist nonsupporters. This spending decision can then enhance the support base of the terrorists by lowering the threshold level of their supporters. A smaller θ in (1) or (3) makes for more non-supporter-specific public good gains and, therefore, a greater likelihood of this scenario. When counterterrorism does more to increase the terrorists' support base than to curb terrorism, such measures become counterproductive. This adverse outcome is through the government's budget constraint and the limited impact of counterterrorism. Examples would be the rise of Hamas and Hezbollah, where constituencies were left with limited social services as government attention was either focused on counterterrorism or elsewhere. By not providing public goods to the Palestinians, Israel gave Hamas an opportunity to attract supporters. Other cases would include nationalist-separatist situations (e.g., Algeria during its fight for independence in the 1950s and early 1960s), where a government ignored the needs of the general population as resources were redirected to the antiterrorism campaign. This scenario also implies increased alienation of a segment of the population and counterterrorism actions with limited effectiveness. Henceforth, this case is equated with a *strong support base* for the terrorists.

If, however, $\alpha b' < -\pi_e [h(f) - h(s)]$, then $\partial \hat{\delta} / \partial e > 0$. Now, an increase in government countermeasures, which directly target the terrorist organization, results in an increase in the threshold level for active terrorist support. This represents a narrowing of the base of active support for the terrorist organization since only those individuals with a relatively high δ will remain engaged in actively financing the terrorists group. In this case, government resources may be more effective in limiting terrorist success than in providing for the needs of potential supporters of the terrorists. If the

general population is already well off, then the opportunity cost of reduced social programs is small. For example, $\alpha b'$ was probably small in the 1970s and 1980s in Europe during the era of left-wing terrorism. This is consistent with θ near 1 in value when public goods are effectively nonexcludable. The government would have had a difficult time excluding terrorist supporters during this period since there were few factors, such as location, to identify them. Hence, effective countermeasures (π_e is large) eventually reduced support for these nihilistic terrorist groups (e.g., the Baader-Meinhof group), thereby raising potential supporters' thresholds. Thus, we characterize this case as a *fragile support base* for the terrorists.

THE TERRORIST ORGANIZATION

Let the interests of the terrorist organization be represented by the following utility function:

$$W = w(a) + x, \quad (6)$$

where w is increasing and concave in a . This specification is consistent with the benefits to the organization being derived from the furtherance of some militant activity a . In addition, the terrorist organization gains utility from the consumption of good x , unrelated to terrorism. This interpretation of (6) is consistent with Stern's (2003) findings that, despite their claim to further strictly religious goals, many terrorist groups serve a mix of sacred and profane interests. The specification also agrees with the rule of a secular leader who fulfills not only the interests of supporters but also his own goals or self-interest. In (6), the probability of terrorist success (or failure) does not *directly* enter the objective function of the terrorist organization. This does not mean that the organization is uninterested in outcomes; it indirectly cares about success through its influence on the mobilization of supporters, felt through the organization's budget constraint. If we also allow success (failure) to directly affect W in (6), our results are somewhat changed.³ Because today's transnational terrorism is predominately driven by fundamentalist terrorists, who are more interested in the deed than in achieving some goal (Hoffman 1998), we rely on the objective in (6) in the text. This objective is also apropos of nihilistic leftist terrorists of the 1970s and 1980s whose goals were poorly defined.

To account for the costliness of terrorist activities and operations, we represent the cost of operations by a strictly increasing, convex function $k(a)$. The terrorist organization obtains σ from each active supporter and must spend c on administering a supporter, where it is reasonable to suppose that $\bar{\sigma} = \sigma - c > 0$, so that a *net* contribution is

3. An alternative way of specifying the terrorists' objective is to write it as

$$W = [1 - \pi(e, a)]r + \pi(e, a)\bar{r} + x = r - \pi(e, a)(r - \bar{r}) + x = w(e, a) + x,$$

for which r and \bar{r} represent the (constant) benefits of terrorist success and failure (with $r > \bar{r}$) and $w(e, a) \equiv r - \pi(e, a)(r - \bar{r})$. The signs on the partials of $w(e, a)$ follow from $-\pi(e, a)$. For further details on this alternative specification, see footnote 5.

derived. We denote the terrorist group’s fixed endowment by y . Thus, the terrorist organization’s budget constraint is

$$x + k(a) = y + \bar{\sigma}(1 - \hat{\delta})p, \tag{7}$$

where expenditures are on the left side (assuming the unit price of x is 1), and net income is on the right side of (7). Given that $1 - \hat{\delta}$ represents the proportion of potential supporters from population p who actively finances the group in equilibrium, the term $\bar{\sigma}(1 - \hat{\delta})p$ represents the net amount of contributions received by the group from its active base. Solving (7) for x and substituting the result into (6), we represent the terrorist group as maximizing its utility:

$$W = w(a) + y + \bar{\sigma}(1 - \hat{\delta})p - k(a), \tag{8}$$

given the level of counterterrorism, e , of the government. The first-order condition is⁴

$$w' - \bar{\sigma}p \frac{\partial \hat{\delta}}{\partial a} - k' = 0. \tag{9}$$

In (9), the first two terms depict the marginal benefits of increased terrorist activity derived from the organization’s activity and the larger net contributions from supporters, while the third term is the marginal costs of terrorist activity. Thus, the terrorists choose their actions to equate the associated marginal benefits and marginal costs.

To further characterize the terrorist group’s behavior in terms of how it responds to the government’s counterterrorism efforts, we implicitly differentiate (9) to determine the slope of the terrorist group’s best-response curve:

$$\frac{\partial a}{\partial e} = \frac{\bar{\sigma}p \frac{\partial^2 \hat{\delta}}{\partial a \partial e}}{w'' - \bar{\sigma}p \frac{\partial^2 \hat{\delta}}{\partial a^2} - k''} < 0. \tag{10}$$

The terrorist group’s best-response curve will be downward sloping because the denominator in (10) is negative (see footnote 4) and $\partial^2 \hat{\delta} / \partial a \partial e$ is positive (Appendix A). The best response for the terrorist group to an increase in the government’s counterterrorism efforts is to decrease its terrorist activity. To determine whether the group’s welfare is increasing or decreasing in government efforts, we differentiate W with respect to e :

$$W_e = -\bar{\sigma}p \frac{\partial \hat{\delta}}{\partial e}. \tag{11}$$

4. The second-order condition requires $w'' - \bar{\sigma}p \frac{\partial^2 \hat{\delta}}{\partial a^2} - k'' < 0$. Since we have assumed $\partial^2 \hat{\delta} / \partial a^2 > 0$ (in Appendix A), the second-order condition is satisfied.

When the threshold level for active support of the terrorist group is increasing in e , $W_e < 0$, so that the group welfare falls with greater countermeasures. If, however, government countermeasures decrease the threshold level and induce more active support for the movement ($\partial\hat{\delta}/\partial e < 0$), then $W_e > 0$.⁵

THE GOVERNMENT

The government’s preferences with respect to the terrorist problem are as follows:

$$U(\pi, g, n) = \pi(e, a) + u(\beta - \alpha e, p\hat{\delta}) \tag{12}$$

where the government’s budget constraint has been substituted for g . In (12), $p\hat{\delta}$ denotes n , the number of potential supporters who chooses *not* to actively aid the terrorist organization. The government gains satisfaction from the likelihood of a terrorist failure and the welfare of nonsupporters. The subutility function, $u(g, n)$, has the following properties: $u_g > 0$, $u_n > 0$, $u_{gg} < 0$, $u_{nn} < 0$, and $u_{gn} > 0$. For a given level of terrorist activity, the government’s problem is then to choose the counterterrorism effort—and thus the spending on potential terrorist supporters—to maximize (12). The resulting first-order conditions is given by⁶

$$\pi_e - \alpha u_g + u_n p \frac{\partial\hat{\delta}}{\partial e} = 0, \tag{13}$$

which, upon rearrangement, gives

$$\pi_e + u_n p \frac{\partial\hat{\delta}}{\partial e} = \alpha u_g. \tag{14}$$

If $\partial\hat{\delta}/\partial e > 0$, then the marginal benefits of increased counterterrorist measures from more terrorist failure and reduced support equal the associated marginal costs from not nurturing potential terrorist supporters. If, however, $\partial\hat{\delta}/\partial e < 0$, then $u_n p (\partial\hat{\delta}/\partial e)$

5. If $w(e, a)$ replaces $w(a)$ in the terrorists’ objective function and we normalize \bar{r} to zero (see footnote 3) so that the probability of success directly influences the terrorists’ welfare, then (11) becomes $W_e = -\pi_e r - \bar{\sigma} p(\partial\hat{\delta}/\partial e)$ since $w_e = -\pi_e r$. The first and second terms on the right-hand side respectively represent the counterterrorism impact on terrorist welfare of the security effect on π and of the mobilizing effect on terrorist support. The security effect is always negative, but the mobilizing effect may be of either sign. Consequently, there are three cases. If $\partial\hat{\delta}/\partial e > 0$, then $W_e < 0$. When, however, $\partial\hat{\delta}/\partial e < 0$, the sign of W_e depends on the relative strengths of the two opposing effects. If the mobilizing effect is small relative to the security effect, then W_e is still negative. For a sufficiently large mobilizing effect, we have $W_e > 0$. This is consistent with a large base of potential supporters for the terrorists, which is the worst-case scenario for the government. In all cases, the impact of government countermeasures on the mobilization of terrorist support remains the key determinant of W_e . Regardless of the specification, the results hinge on two scenarios later displayed in Figures 1 and 2.

6. The second-order condition,

$$\pi_{ee} + \alpha^2 u_{gg} - 2\alpha u_{gn} p \frac{\partial\hat{\delta}}{\partial e} + u_{nn} p^2 \left(\frac{\partial\hat{\delta}}{\partial e} \right)^2 + u_n p \frac{\partial^2\hat{\delta}}{\partial e^2} < 0,$$

is always satisfied for $\partial\hat{\delta}/\partial e > 0$. If $\partial\hat{\delta}/\partial e < 0$, then the second-order condition holds provided that the value of the middle term is outweighed by the absolute value of the sum of the other four terms.

represents an additional marginal cost of counterterrorism efforts as government's neglect of potential supporters of the terrorists augments their support base.

From an implicit differentiation of (13), we have the slope of the government's best-response function:

$$\frac{\partial e}{\partial a} = \frac{-\pi_{ea} + \alpha p u_{gn} \frac{\partial \hat{\delta}}{\partial a} - p^2 u_{mn} \frac{\partial \hat{\delta}}{\partial a} \frac{\partial \hat{\delta}}{\partial e} - p u_n \frac{\partial^2 \hat{\delta}}{\partial e \partial a}}{\pi_{ee} + \alpha^2 u_{gg} - 2\alpha u_{gn} p \frac{\partial \hat{\delta}}{\partial e} + u_{mn} p^2 \left(\frac{\partial \hat{\delta}}{\partial e}\right)^2 + u_n p \frac{\partial^2 \hat{\delta}}{\partial e^2}}, \tag{15}$$

which is assumed to be positive.⁷ Finally, differentiating the government's objective function with respect to a shows that government utility is decreasing in a . That is,

$$U_a = \pi_a + p u_n \frac{\partial \hat{\delta}}{\partial a} < 0. \tag{16}$$

With a on the vertical axis and e on the horizontal axis, the direction of increasing utility for the government is down and to the right, where terrorist attacks fall.

STRATEGIC INTERACTION

The Nash equilibrium of the first-stage, simultaneous-move game is obtained by solving (9) and (13) for the values of e and a . This, in turn, determines at which point a potential supporter is indifferent about actively supporting the terrorist group or not.⁸ There are two scenarios of interest based on whether the sign of $\partial \hat{\delta} / \partial e$ is positive or negative.⁹ We examine each case separately.

SCENARIO 1: $\partial \hat{\delta} / \partial e > 0$ —THE CASE OF A FRAGILE SUPPORT BASE

This case supposes that counterterrorism can limit terrorist success without unduly alienating potential terrorist supporters by neglecting their needs (i.e., $\alpha b' < -\pi_e [h(f) - h(s)]$), so that an increase in e raises the threshold level for active support of the terrorist group and results in less support for the movement. This implies

7. The denominator in (15) is negative when the second-order condition is satisfied, so that the sign of the whole expression depends negatively on the sign of the numerator. When $\partial \hat{\delta} / \partial e > 0$, all terms in the numerator are negative, and the government's best-response function is upward sloping. If $\partial \hat{\delta} / \partial e < 0$, the sign of (15) remains positive, so long as the expression associated with this term remains relatively small compared to the rest of the numerator.

8. An equilibrium of this first-stage game exists in pure strategies if (1) the government's and terrorist group's strategy sets are convex, closed, and bounded; (2) their payoff functions are continuous; and (3) their payoff functions are concave (Dasgupta and Maskin 1986). Condition (1) is satisfied since the adversaries' activities are constrained by their budget sets, while condition (3) holds because utility functions are strictly concave. Condition (2) is satisfied provided that $\hat{\delta}$ remains interior, between 0 and 1. Equilibrium is unique since the players' payoff or utility functions are strictly concave.

9. Without a specific payoff function, our condition for the sign of $\partial \hat{\delta} / \partial e$ is not just a function of the model's parameters but is endogenously dependent on e .

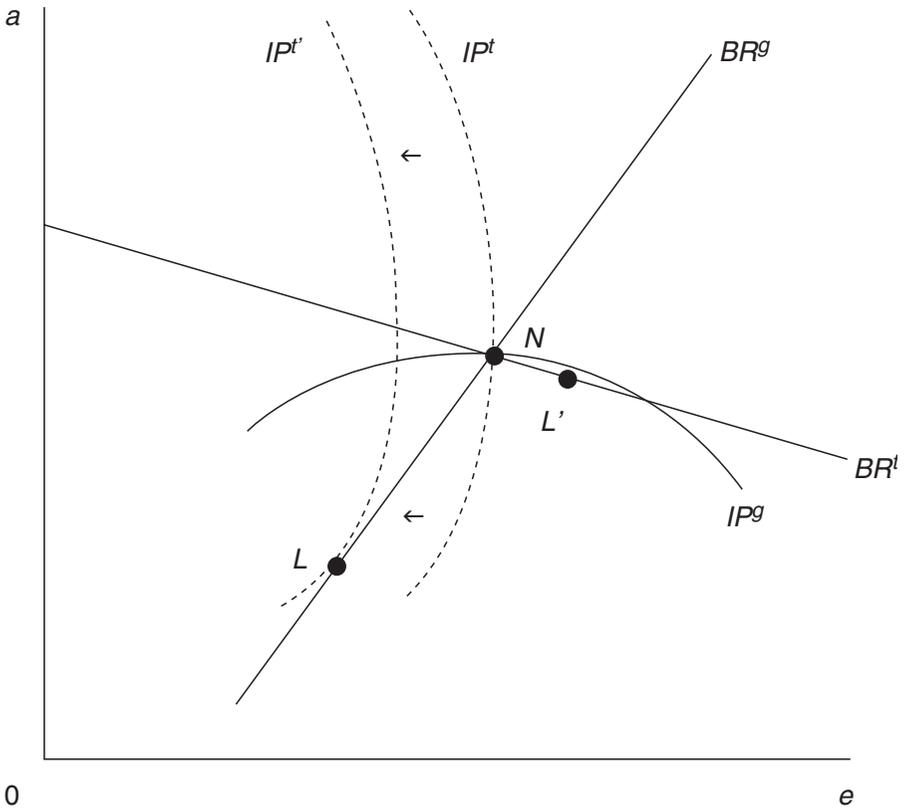


Figure 1: Government and Terrorists Strategic Interaction: Scenario 1

that the iso-payoff contour for the terrorist group resembles that of a backward “C” in Figure 1, where contours representing higher levels of payoffs lie to the northwest, where there is less counterterrorism spending for each level of terrorist effort. The best-response curves (BR) and iso-payoff contours (IP) for the terrorist group and the government, along with the resulting Nash equilibrium (point N), are depicted in Figure 1. Superscript t and g refer to the terrorists and government, respectively.

The nature of this first scenario and equilibrium is that potential terrorist supporters will not offer their support when faced with greater antiterrorism effort. This occurs even though more spending on counterterrorism implies less spending on g to raise the welfare of terrorist nonsupporters. The terrorist group accounts for its fragile support base when determining its optimal level of militant activity. The characteristics of the scenario are more likely to arise when the marginal benefit of government spending with respect to g is quite low, which can result if g levels are already high so that $b'(g)$ is small. This marginal benefit is also small when potential

supporters are unresponsive to changes in g , which can occur if the public goods' benefits are received equally by terrorist supporters. Scenario 1 is also likely to arise when government counterterrorism policy is particularly effective, in which the marginal impact of government actions on the probability of terrorist failure is large.

Leftist terror campaigns of the 1970s and 1980s best fit the first scenario. The Red Brigades in Italy, Direct Action in France, the CCC in Belgium, and the Red Army Faction in West Germany needed to limit their brutality to woo supporters. The general public never "bought into" the terrorists' ill-defined nihilistic goals that threatened most people's structured lives. These groups' potential support base was very fragile. As targeted governments redirected some spending with mostly nonexcludable benefits to counterterrorism, there was no groundswell of support for the terrorists. More important, the governments' counterterrorism measures were quite effective in infiltrating groups and gaining strategic intelligence. By the end of the cold war, these four groups had either been wiped out or disbanded (Hoffman 1998). Other left-wing European groups suffered similar fates.

Figure 1 also offers some insights into the players' behavior and their willingness to act strategically.¹⁰ If, for example, players had the ability to precommit and obtain a higher payoff in the resulting leader-follower equilibrium, then the terrorist group would prefer to move first and the government would prefer to move second. This is depicted by the shift in the iso-payoff contour from IP^i to IP'' , with the leader-follower equilibrium at L , where IP'' is tangent to the government's best-response curve. Compared to the Nash equilibrium at N , the terrorist group *and* the government are better off at L . The terrorists are on a higher utility level at L since iso-payoff contours to the west represent improved terrorists' payoffs. For the government, the iso-payoff curve through L (not drawn) is also a better outcome than the one through N . If, however, the government leads, then the associated leader-follower equilibrium is at L' (with the government's iso-payoff curve tangent to BR^i). At L' the terrorists are worse off than at L or N , and the government is not as well off as at L . For this game, the terrorists have a clear first-mover advantage, and the government has a clear second-mover advantage.

At L in Figure 1, the terrorists' actions *and* the government's countermeasures are smaller than at the Nash equilibrium. The outcome is surprising since the terrorists lower their own level of violence when assuming a leadership role. Even though their reduced campaign hurts the terrorists' ability to meet their goals and obtain grassroots support, the terrorists are still better off because of a significant drop in the government's *effective* antiterrorist efforts. Owing to their weak support base and the formidable threat of the government, terrorists gain more in this scenario by seizing the initiative and turning down the heat. De-escalation by both the terrorist group and government makes both parties better off. Contrary to intuition, the government does not necessarily have to move first and preempt the terrorist group to arrive at a superior outcome. The terrorists prefer to limit their violence to operate under the

10. Eaton (2004) provides a similar analysis. However, his study covers symmetric social dilemmas in which both players' best-response curves possess the same slope, and players' iso-payoff contours have a similar orientation to their own axis.

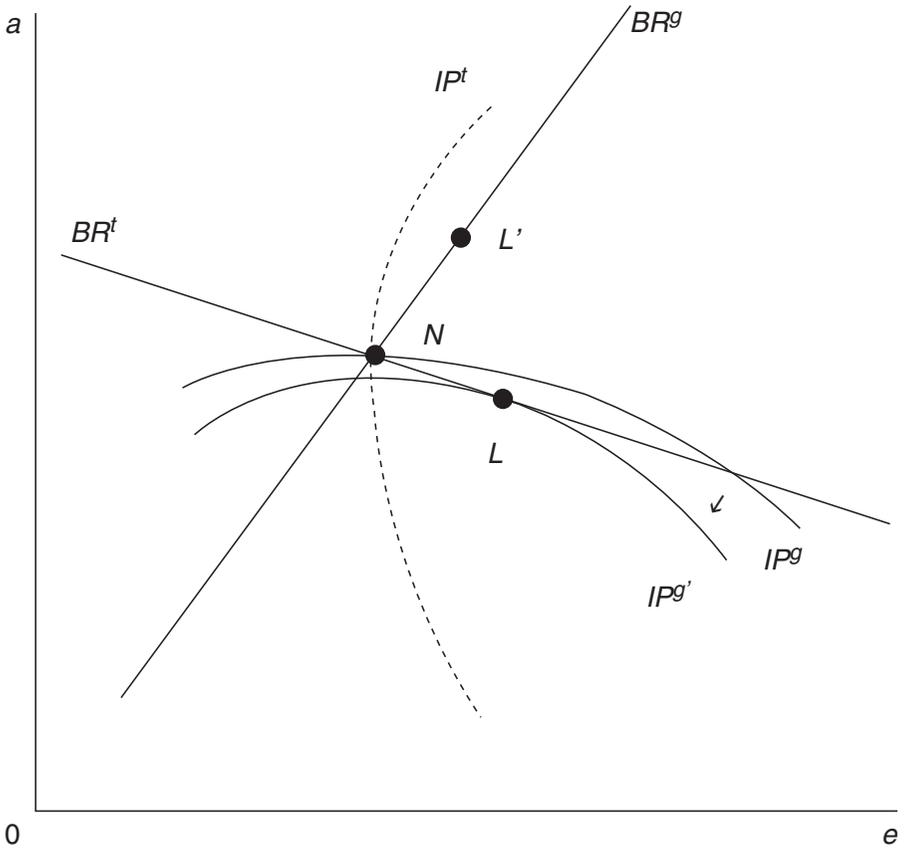


Figure 2: Government and Terrorists Strategic Interaction: Scenario 2

government’s radar. Many of the left-wing groups reduced their campaigns in the late 1980s when the targeted governments became more adept at rooting them out and supporters were harder to attract (Hoffman 1998).

SCENARIO 2: $\partial \hat{\delta} / \partial e < 0$ —THE CASE OF A STRONG BASE

If a dollar of government spending is more effective in providing excludable benefits to nonsupporters of terrorism than in curbing terrorism (i.e., $\alpha b' > -\pi_e[h(f)-h(s)]$), then an increase in e lowers the threshold level for active support for the terrorist group and enhances the backing for the group. This then reverses the convexity of the terrorists’ iso-payoff curves, which are now C-shaped in Figure 2, where curves to the southeast represent greater levels of well-being (recall the discussion surrounding (11)). The best-response curve for the terrorists is still downward sloping. For the government, its

iso-payoff curves and best-response path are the same as in the first scenario. In Figure 2, the Nash equilibrium, N , corresponds to where respective iso-payoff curves for the terrorists and the government achieve a maximum for the best-response choice of its adversary.

A study of Figure 2 indicates that the government prefers to assume the initiative in the second scenario and move first. By so doing, the government obtains a higher payoff at the associated leader-follower equilibrium at L as IP^g shifts to $IP^{g'}$ —the government's iso-payoff level through L is better than that through N . This strategic move increases its counterterrorism measures, while it results in a decrease in terrorist attacks. Because the increase in counterterrorism has a larger (adverse) impact on nonactive, potential supporters of the terrorist group than on the terrorists, the government's offensive actually augments terrorists' welfare. This follows insofar as the terrorists' iso-payoff curve (not shown) through L is better than that through N . By seizing the initiative, the government avoids a worse outcome in which the terrorists take the leadership role and increase their attacks at point L' , where IP' (not displayed) is tangent to BR^g . At L' the government is not only worse off than at N or L , but also the terrorists are not as well off as they would be at L (i.e., the iso-payoff curve through L is further eastward than that through L'). At L , there is less need for the terrorist group to engage in costly terrorist activities to attract supporters. In this scenario, government leadership is preferred by both adversaries to either the Nash equilibrium or terrorist group leadership. The results of our analysis for the two cases are summarized in proposition 1. For a formal argument, see Appendix B.

Proposition 1: Given the slopes of the agents' best-response functions ((10), (15)) and the direction of welfare improvement ((11), (16)), if the terrorists have a fragile support base, then they are motivated to assume a leadership role that limits their terror campaign. As a consequence, the government also gains as it reduces its countermeasures. If, however, the terrorists have a solid support base, then the government is motivated to assume a leadership role that augments its countermeasures. As a consequence, the terrorists also gain as they curtail action.

In both scenarios, the weaker party is better off by seizing the initiative, while the stronger party is also better off by conceding the initiative.

SUBSIDIZING THE TERRORIST GROUP AS A COMMITMENT DEVICE

Given the inherent asymmetry of the interaction between the government and terrorists, we explore whether outside sponsorship arrangements exist for terrorists to engage in more militant activity than what the previous scenarios imply. Although some terrorist groups do gradually (and voluntarily) fade away and become irrelevant, as suggested by scenario 1 (e.g., Red Army Faction), some are remarkably persistent and remain a viable means for violent protest. One explanation for the difference may be that some groups have a stronger popular base of support (e.g.,

Tamil Tigers) than others. When, however, such grassroots support is lacking, a substitute is independent financial backing of the terrorist organization by a franchiser (e.g., al-Qaida) or a state sponsor. An impetus for such a financial arrangement is present if there exists a state, organization, or an individual who values militant action and has the financial wherewithal either to franchise out its militant program or to further its own interests by influencing militant groups' behavior. Suppose that there exists just such a "terrorist financier." The sponsor then has the ability to alter the strategic environment that previously existed between the government and the terrorist organization. This can occur because the financier helps serve as a commitment device by which a terrorist group can engage in higher levels of activity than is implied by the earlier analysis.

The timing of the sponsorship game is similar to before, except that a prior stage is added where the sponsor moves first and chooses the level of terrorist support. Then the terrorist group and the government simultaneously choose attacks and countermeasures, respectively. Last, the pool of potential supporters determines their loyalty to one side or the other, based on the equilibrium level of a and e at the second stage.

To establish the financier's or sponsor's role, we let t represent the fixed payment or grant and γ denote the per unit payment or subsidy provided by the sponsor to the terrorist group. The terrorists' objective function is now

$$W = w(a) + y + \bar{\sigma} (1 - \hat{\delta}) p - k(a) + t + \gamma a. \tag{17}$$

The government's objective function is still (12). The first-order conditions characterizing the Nash equilibrium for the government and the terrorist group (at the second stage of the game) are (18) and (19), respectively:

$$\pi_e(e, a) - \alpha u_g(\beta - \alpha e, p\hat{\delta}) + p u_n(\beta - \alpha e, p\hat{\delta}) \frac{\partial \hat{\delta}}{\partial e} = 0, \tag{18}$$

$$w'(a) - k'(a) - p\bar{\sigma} \frac{\partial \hat{\delta}}{\partial a} + \gamma = 0. \tag{19}$$

Based on (18) and (19), a simple exercise in comparative statics (see Appendix C) establishes that terrorist attacks and government countermeasures are increasing in the subsidy, γ . In terms of the graphs of Figures 1 and 2, an increase in the sponsor's per unit subsidy shifts the terrorists' best-response curve BR' up and to the right (not shown), thus resulting in an increase in the Nash equilibrium level of a and e . When deciding its optimal support, γa , for the militant activities of the terrorists, a sponsor must consider not only its influence on a and e but also terrorists' incentive to accept sponsorship. In the latter case, the sponsor's fixed payment must ensure the fulfillment of a participation constraint, whereby the terrorist group's welfare is at least as great as its next best alternative. These two considerations require that the sponsorship has both a variable and fixed component. We now introduce the sponsor's constrained optimization to the analysis.

Let the preferences of the sponsor be represented by

$$F(a) = f(a) - t - \gamma a, \tag{20}$$

where $f(a)$ is strictly increasing and concave in a . This specification assumes that the sponsor directly benefits from the activities of the terrorist group, thereby motivating the sponsor to influence the activities of the terrorists through judicious choice of t and γ . The sponsor's problem is to choose t and γ while taking into account the impact of its choices on the actions of the government, the terrorist group, and its supporters to

$$\begin{aligned} &\text{Maximize } [f(a) - t - \gamma a], \\ &\text{subject to } w(a) + y + \bar{\sigma} (1 - \hat{\delta}) p - k(a) + t + \gamma a \geq \bar{W}. \end{aligned} \tag{21}$$

In the terrorist group's participation constraint, \bar{W} denotes the terrorists' welfare in a simultaneous-move game, played in the absence of a sponsor. Solving the participation constraint for t and substituting the result into the objective function, we obtain

$$\text{Maximize } [f(a) + w(a) + y + \bar{\sigma} (1 - \hat{\delta}) p - k(a) - \bar{W}], \tag{22}$$

with the first-order condition given by

$$f' \frac{\partial a}{\partial \gamma} + \left[w' - k' - \bar{\sigma} p \frac{\partial \hat{\delta}}{\partial a} \right] \frac{\partial a}{\partial \gamma} - \bar{\sigma} p \frac{\partial \hat{\delta}}{\partial e} \frac{\partial e}{\partial \gamma} = 0. \tag{23}$$

Using

$$\gamma = - \left[w'(a) - k'(a) - \bar{\sigma} p \frac{\partial \hat{\delta}}{\partial a} \right]$$

from the terrorist group's first-order condition that characterizes the Nash equilibrium, we can solve (23) for γ :

$$\gamma = f' - \frac{\bar{\sigma} p \frac{\partial \hat{\delta}}{\partial e} \frac{\partial e}{\partial \gamma}}{\frac{\partial a}{\partial \gamma}}. \tag{24}$$

When the terrorist support base is strong so that $\partial \hat{\delta} / \partial e < 0$, the second term on the right-hand side of (24) is positive, thus ensuring that γ is positive. In this case, the variable payment by the supporter and its impact on government policy reinforces the rising support for the terrorists that already stems for enhanced counterterrorism. This effect adds to the sponsor's marginal benefit (f') from increased terrorist activity. The result is higher levels of both government and terrorist activity as conflict increases. This is the dangerous situation that Israel confronted at the start

of the second Intifada in September 2000. Outside sponsors (e.g., Iraq and Iran) could take advantage of the growing grassroots support for terrorist activities by subsidizing attacks. Following U.S. occupation, Iraq is an analogous situation. Since its formation, al-Qaida has tried to identify those struggles where its support would escalate violence and foment a "Clash of Civilizations" (Byman et al. 2001).

If, however, $\partial\hat{\delta}/\partial e > 0$, γ may be negative when the second term on the right-hand side of (24) is larger than the first term. In this case, the interests of the terrorists overshadow those of the sponsor, and the rationale for sponsorship disappears. If the sponsor then withdraws its negative support, the terrorist group's best-response curve shifts up and to the right. This leads to more terrorism and larger countermeasures. Nevertheless, the terrorist campaign is larger than when the terrorists assume a leadership role in scenario 1 without the sponsor.

Thus we have the following proposition:

Proposition 2: Sponsorship increases the level of terrorist activity and the government countermeasures if the terrorists' support base is strong. When this support base is weak, sponsorship only promotes terrorism and augments countermeasures when a positive subsidy is consistent with the terrorists' participation constraint.

The inclusion of the participation constraint indicates that a sponsor's intent to foster violence need not further a terrorist group's agenda in all circumstances. The basis of the terrorists' grassroots support is an important consideration when ascertaining whether outside sponsorship will be accepted.

CONCLUDING REMARKS

During the 1980s, state sponsorship was a primary policy concern for transnational terrorism (Hoffman 1998). At the time, there was a consensus that sovereign states assisted, influenced, and financed various terrorist groups. There was little disagreement that this state sponsorship of terrorism increased during the 1980s. Then, as now, accusations were leveled against particular states being sponsors (e.g., Syria, Iran, Iraq, and North Korea), most of which are still on the list today (see, e.g., U.S. Department of State 2004). The main difference today is the realization that some terrorist groups, organizations (e.g., some alleged charities), and wealthy individuals also sponsor terrorism. With increased globalization and innovations in communications, sponsors have an easier time to promote a cause and direct resources to terrorist groups for violent purposes. Such support permits terrorist groups to be less reliant on grassroots support. This outside sponsorship may be particularly helpful when the terrorists have weak popular support, provided that the outside support is consistent with the participation constraints of the terrorists. Outside sponsorship not only limits the need for terrorists to rely on popular support but also provides incentives for the terrorists to focus on their mission.

As a result of the new character of sponsorship, one of the challenges confronting governments is that it is no longer enough to target pariah states or to outcompete the terrorists for grassroots support. If governments do not pay heed to how terrorism

may be financed by outside agents, then counterterrorism efforts and even the provision of social programs (to limit grassroots support for the terrorists) may be insufficient to maintain terrorism within tolerable limits. Adams (1986, 237-48) makes a similar point by indicating that Western governments' tendency to ignore how terrorism is financed compromises the effectiveness of measures against terrorism.

Our analysis has good and bad news. The good news is that there is a strategic regulator—previously unidentified—that curtails the level of violence when the appropriate adversary seizes the initiative and leads. When the terrorists have strong grassroots support, the government is better off taking the initiative. When, instead, the terrorists have weak grassroots support, the terrorists are better off seizing the initiative. In either scenario, leadership curtails violence and makes *both* the terrorists and the government better off. The driver of this surprising finding is the reaction of citizens (“the grassroots”) whose allegiance can go either way. The bad news concerns the ability of outside sponsors—charities, franchisers, or other terrorist groups—to limit this regulator, thereby augmenting conflict. With nonstate sponsors, governments must devise novel means for severing the links between these sponsors and terrorists. These new supporters are often harder to target than state sponsors, owing to informational and political constraints. How to circumvent these constraints is a topic for future research.

This is the first article to examine the strategic implications associated with grassroots support and outside sponsorship.

APPENDIX A Second-Order Partial of $\hat{\delta}$

Differentiation of (3), where $g = \beta - \alpha e$, gives

$$\frac{\partial^2 \hat{\delta}}{\partial e^2} = -\frac{1}{2} \{-\alpha^2 b'' + \pi_{ee}[h(f) - h(s)]\} < 0, \tag{A1}$$

$$\frac{\partial^2 \hat{\delta}}{\partial e \partial a} = \frac{1}{2} \{-\pi_{ea}(h(f) - h(s)) - \pi_e[h_a(f) - h_a(s)]\} > 0, \tag{A2}$$

and

$$\frac{\partial^2 \hat{\delta}}{\partial a^2} = -\frac{1}{2} \{\pi_{aa}[h(f) - h(s)] + 2\pi_a[h(f) - h(s)] + \pi h_{aa}(f) + (1 - \pi)h_{aa}(s)\}. \tag{A3}$$

This last expression is positive provided that

$$2\pi_a[h(f) - h(s)] < -\pi_{aa}[h(f) - h(s)] - \pi h_{aa}(f) - (1 - \pi)h_{aa}(s), \tag{A4}$$

where all four expressions are positive. If, for instance, terrorists' efforts do not decrease their likelihood of failure (π) by much (π_a is small), then this inequality is likely to hold. Other scenarios allow the three right-hand expressions to overwhelm the single left-hand term. Henceforth, we assume $\partial^2 \hat{\delta} / \partial a^2 > 0$.

If $\pi_{ea} < 0$, the sign of (A2) remains positive provided that $-\pi_e [h_a(f) - h_a(s)] > 0$ is sufficiently large. As noted in the text, we have assumed that $\pi_{ea} > 0$ to reflect asymmetric conflict between terrorists and the government.

APPENDIX B
Proof of Proposition 1

The endogenous choice of roles requires mutual agreement by the players (implicit or otherwise). That is, a player cannot be a leader unless it gains from moving first and the other player prefers to follow. If both players disagree about the timing of moves (e.g., both want to lead), then a simultaneous-move game results. We thus focus on the set of outcomes that Pareto dominates the Nash equilibrium at N (i.e., the lens-shaped area defined by IP^s and IP^l in Figures 1 and 2). At the Nash equilibrium, the associated iso-utility curves, IP^s and IP^l , have horizontal and vertical tangents, respectively, that partition the graph into four quadrants, only one of which contains the Pareto-dominant lens-shaped set to N . Because the best-response paths have opposite slopes, only one enters the quadrant containing the Pareto-dominant set. Consequently, there is a single leader-follower outcome, L , that Pareto dominates the simultaneous-play Nash equilibrium. The follower is the player whose best-response path enters the Pareto set. QED

Our proof is based on Hamilton and Slutsky (1990) and their model of a game with endogenous timing and observable delay. Further details can be found in their article.

APPENDIX C
Influence of Sponsorship Subsidy

Using the implicit function theorem and differentiating equations (18) and (19) with respect to γ , we derive

$$\begin{bmatrix} A_1 & A_2 \\ B_1 & B_2 \end{bmatrix} \begin{bmatrix} \frac{\partial e}{\partial \gamma} \\ \frac{\partial a}{\partial \gamma} \end{bmatrix} = \begin{bmatrix} 0 \\ -1 \end{bmatrix}, \tag{A5}$$

where

$$A_1 \equiv \pi_{ee} + \alpha^2 u_{gg} - 2\alpha p u_{gn} \frac{\partial \hat{\delta}}{\partial e} + p^2 u_{nn} \left(\frac{\partial \hat{\delta}}{\partial e} \right)^2 + p u_n \frac{\partial^2 \hat{\delta}}{\partial e^2} < 0,$$

$$A_2 \equiv \pi_{ea} - \alpha p u_{gn} + p^2 u_{nn} \frac{\partial \hat{\delta}}{\partial e} \frac{\partial \hat{\delta}}{\partial a} + p u_n \frac{\partial^2 \hat{\delta}}{\partial e \partial a} > 0,$$

$$B_1 \equiv -p \bar{\sigma} \frac{\partial^2 \hat{\delta}}{\partial a \partial e} < 0,$$

$$B_2 \equiv w'' - k'' - p \bar{\sigma} \frac{\partial^2 \hat{\delta}}{\partial a^2} < 0.$$

Given that $A_1B_2 - A_2B_1 > 0$ must hold for stability, the sign of the comparative statics with respect to γ is

$$\frac{\partial e}{\partial \gamma} = \frac{A_2}{A_1B_2 - A_2B_1} > 0, \quad (\text{A6})$$

$$\frac{\partial a}{\partial \gamma} = \frac{-A_1}{A_1B_2 - A_2B_1} > 0. \quad (\text{A7})$$

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