TOO MUCH OF A GOOD THING? THE PROACTIVE RESPONSE DILEMMA

by

Peter Rosendorff and Todd Sandler
School of International Relations
University of Southern California
Von Kleinsmid Center 330
Los Angeles, CA 90089-0043

Office Phone: 213-740-9695
Office Fax: 213-742-0281
Home Fax: 323-256-7900

bpeter@usc.edu
tsandler@usc.edu

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AUTHORS' NOTE: Rosendorff is the Director of the Center for International Studies and Associate Professor of International Relations and Economics. Sandler is the Robert R. and Katheryn A. Dockson Professor of International Relations and Economics. Both authors are also members of the Department of Economics. Both acknowledge research support from the Center for International Studies, University of Southern California. The authors have profited from comments provided by an anonymous referee, Barry O'Neill, Geoffrey Heal, and Bruce Russett on an earlier draft.

TOO MUCH OF A GOOD THING? THE PROACTIVE RESPONSE DILEMMA

Abstract

This paper presents a two-player proactive response game: the targeted government first chooses its measures to weaken the terrorists, and the terrorists then choose the type of event – normal or spectacular – whose outcome is dependent on proactive responses and nature. Unlike previous analyses, proactive policy has a downside by increasing grievances and, consequently, terrorist recruitment. If the government responds too harshly, its actions can empower the terrorists by providing a larger constituency. Aggressive antiterrorist actions, encouraged by a high perceived loss from terrorism and low marginal proactive costs, may result in spectacular events with dire consequences. If spectaculars are transferred abroad to soft targets, then proactive operations may be excessive from a global viewpoint as external costs are ignored. The analysis explains why some target nations engage in a modest level of offense, while a prime target chooses a large level.

Keywords: proactive measures; terrorist recruitment; externalities; noncooperative games; international cooperation; terrorist spectaculars.

TOO MUCH OF A GOOD THING? THE PROACTIVE RESPONSE DILEMMA

Since 9/11, there is an enhanced interest in applying theoretical and statistical modeling to examine terrorism (see, e.g., Azam forthcoming; Blomberg, Hess, and Weerapana 2004; Bueno de Mesquita 2004; Heal and Kunreuther 2004; Li and Schaub 2004; Sandler and Enders 2004). Models are also being applied to investigate the effectiveness of alternative counterterrorism policies (Arce and Sandler 2004; Enders and Sandler 1993, 1995; Sandler and Arce 2003). Countermeasures to the threat of terrorism fall into two categories: defensive and proactive measures. Defensive policies include hardening targets, installing technological barriers, securing borders, deploying sky marshals, and issuing identity cards. Often such actions deflect the intended attack to a softer target, thereby creating collateral damage. In contrast, proactive actions involve direct strikes against a terrorist group or its assets, retaliation against a state sponsor (e.g., a country providing a safe haven), gathering intelligence, assassinating terrorists, or infiltrating a terrorist group. These proactive policies are intended to weaken a terrorist group or compromise its security for the purpose of limiting and ultimately ending the group's operations.

Proactive tactics against a terrorist group – for example, the US-led attack in Afghanistan against the Taliban and al-Qaida or Israel's assassination of Hamas terrorists (Sheikh Ahmed Yassin and Abdel Aziz Rantisi) in 2004 – are characterized in the literature as a pure public good, because a weakened terrorist group poses less of a threat to all potential targets (Sandler 2003; Sandler and Siqueira 2003; Sandler, Tschirhart, and Cauley 1983). For international terrorism, such benefits are received by all targeted countries and do not diminish when shared by more at-risk countries. As a transnational pure public good, a proactive response is anticipated to be undersupplied because the provider does not include the marginal benefits conferred on other likely targets when deciding its provision level.

At the international level, a proactive response is anticipated to be taken by the prime target of terrorist attacks, insofar as this nation derives greater benefits from such actions (Arce and Sandler 2004). Given that 40% of transnational terrorist attacks are against US people or property,[1] the United States has understandably provided the most proactive measures against the al-Qaida network after 9/11. During fiscal year 2004, the United States allocated almost $53 billion to combating terrorism with defensive measures accounting for $23.9 billion (US General Accounting Office 2004). Much of the rest went to proactive efforts of the Department of Defense and other US departments and agencies.[2]

Proactive operations that bomb alleged terrorist assets, hold suspects without charging them, assassinate suspected terrorists, curb civil freedoms, or impose retribution on alleged sponsors may have a downside by creating more grievances in reaction to heavy-handed tactics or unintended collateral damage. Such operations can lose government support and thereby empower terrorists through more favorable world opinion and a larger constituency. Consequently, proactive measures may promote recruitment to the terrorist network, thus offsetting some of the favorable effects. At the transnational level, recruitment represents a public bad that may impact countries differently depending on their relationship with the proactive country. This recruitment depends not only on the terrorist success in an event, where success encourages recruitment, but also on the nature of the event – i.e., a normal event with a modest impact or a spectacular event with a high death toll *or* a symbolic nature. Spectaculars grab headlines and remain in the public's consciousness long after the event. The term "spectaculars" is used officially and in the literature to describe influential terrorist attacks. Such events further recruitment to the terrorist group.

The purpose of this paper is to analyze a government's proactive decision when it may not only harm the terrorist group by limiting its ability, but also help the group attract recruits

and legitimacy. This tradeoff epitomizes the liberal democratic dilemma in responding to a terrorist threat – a government that responds by too little appears unable to protect its citizens and loses popular support, while a government that responds by too much appears tyrannical and encourages opposition (Wilkinson 2001). Major proactive campaigns may actually promote large-scale or newsworthy spectaculars if the recruitment consequence of repressive actions is sufficiently strong; thus, too much reliance on offensive actions may result in a disastrous outcome. Because such spectaculars can occur anywhere owing to the globalization of terrorism, the collateral damage from excessive measures may take place half a world away from the nation whose actions incited the grievance and recruitment. As such, proactive operations are best understood as generating both public benefits *and* costs. A secondary, but related, purpose is to contrast the US approach following 9/11 with that of the European Union (EU). The former tries to eliminate the terrorist risk through a "war on terror," while the latter manages the risk with greater reliance on defensive actions.

BASIC GAME SET UP

The underlying game is played by two players: a target government (*E*) and a terrorist group (*T*). In Figure 1, the game is displayed with the corresponding payoffs at the game's four possible outcomes. The target government moves first and chooses a proactive level, $\theta \in [1, \infty)$, followed by the terrorists who choose the type of attack – spectacular (*s*) or normal (*n*). Nature then determines the outcome based in part on the proactive response. The cost of proactive measures is $P(\theta)$, where the marginal cost is positive. For simplicity, $P(\theta)$ is assumed to equal $p\theta$, where $p > 0$. Spectaculars are major newsworthy terrorist events with either a high death toll or a watershed character (e.g., the 1972 Munich Olympic attack on the Israeli athletes),

while normal events are all other terrorist incidents. Even though just six people died, the 1993 bombing of the World Trade Center was a spectacular event, because over 1000 people were injured, it caused over $500 million in damages, it struck a major landmark, and its remains in the news over a decade later. The downing of an airliner or an armed massacre at an international airport (e.g., the armed attack at Vienna's Schwechat and Rome's Fiumicino Airports on 27 December 1985) are also spectaculars with lasting impacts. Although spectaculars yield a higher payoff to the terrorists than a normal event, spectaculars have a smaller success probability, $\pi_s(\theta)$, than a normal event, whose success probability is $\pi_n(\theta)$. In particular, we assume that $\pi_n = 1/\theta$ and $\pi_s = 1/(r\theta)$, where $r > 1$ so

$$\pi_n > \pi_s. \tag{1}$$

At the four endpoints in the game tree of Figure 1, the payoffs of the government and the terrorists are displayed with the government's payoffs listed above those of the terrorists. If a spectacular is successful, then the government loses both *S* and the cost of its proactive response. The cost of a proactive measure is analogous to an insurance premium, paid in all states of the world; thus, $P(\theta)$ is part of the government's loss in all four outcomes. For successful spectaculars, the terrorists gain *S* plus a recruitment benefit of $c_{ss}\theta$, positively dependent on the proactive effort. The *marginal* recruitment benefit from a successful spectacular is c_{ss}. Although the terrorists gain what the government loses, the game is not zero-sum because of the second term in the two payoffs. If, however, the spectacular fails, the government just loses its proactive expense, while the terrorists lose *L* but may gain recruitment benefits of $c_{fs}\theta$ with $c_{fs} \geq 0$ and $c_{ss} > c_{fs}$, since success generates more recruits than failure. In the 5 September 1972 Munich Olympics attack, the Black September terrorists failed when the West German police

opened fire in a rescue attempt at Fürstenfeldbruck airbase prior to the terrorists boarding a Lufthansa Boeing 727 to take them and the hostages to Cairo. Despite Black September's failure to achieve any of its demands or to escape the scene, the Munich incident resulted in "thousands of Palestinians" rushing to join the terrorist organization in the weeks that followed (Hoffman 1998, 71).

We now turn to the two sets of payoffs at the bottom right of the game tree, corresponding to a normal event's success and failure. For success, the government loses N and its proactive costs, where $S > N$ because a normal event has a smaller associated loss than a spectacular event. The terrorists gain N plus a recruitment benefit of $c_{sn}\theta$. The marginal recruitment gain associated with a successful normal incident is less than that associated with a successful spectacular – i.e., $c_{sn} < c_{ss}$. Obviously, our parameters are chosen to keep the analysis simple while capturing the essential aspects of the underlying situation. The model is sufficiently general to allow for $c_{sn} \gtreqless c_{fs}$, so that recruitment for failed spectaculars may exceed or fall short of successful normal events. Finally, the payoffs for a failed normal event is $-P(\theta)$ and 0 for the government and terrorists, respectively. The 0 merely indicates that we have normalized this payoff for simplification so the other payoffs to the terrorists are above this value.

BASELINE MODEL: NO RECRUITMENT

To highlight the influence of recruitment on the analysis, we first present the case where there is no recruitment, which comes the closest to the literature, except that we consider the terrorists' choice between spectaculars and normal events.[3] Thus, we assume that $c_{ss} = c_{sn} = c_{fs} = 0$ in Figure 1. To solve for the subgame perfect equilibrium to the game, we

apply backward induction by first solving for the terrorists' choice of events and then conditioning the government's choice on that of the terrorists. This procedure identifies the subgame perfect equilibrium to this two-player game. The terrorists choose between a spectacular and a normal event according to:

$$EU^T(s;\theta) \gtreqless EU^T(n;\theta), \tag{2}$$

where EU^T is the terrorists' expected utility, which equals

$$\frac{1}{r\theta}(S+L)-L \gtreqless \frac{1}{\theta}N. \tag{3}$$

This last inequality follows from the no-recruitment payoffs and the relevant success probabilities. The terrorists engage in a spectacular if and only if

$$\tilde{\theta} = \frac{S+L-rN}{rL} \geq \theta, \tag{4}$$

and execute a normal event otherwise, where $\tilde{\theta}$ denotes the critical level of proactive response that induces a spectacular. Since $\theta \geq 1$, a necessary condition for the terrorists to choose a spectacular in the subgame perfect equilibrium is that $S/N > r,$ which follows from equation (4).[4]

If the gain, *S*, from a spectacular rises, then $\partial\tilde{\theta}/\partial S = 1/rL > 0;$ thus, $\tilde{\theta}$ is more apt to exceed $\theta,$ thereby making spectaculars more likely. When either the terrorists' losses from a failed spectacular rises or the relative likelihood of a spectacular's success falls (as *r* rises), $\tilde{\theta}$ falls in value and a spectacular is less likely.[5] These comparative static results agree with intuition.

To complete the search for a subgame perfect equilibrium, we now turn to the government's choice of proactive measures, conditioned on the terrorists' choice of events. The government chooses θ to

$$\max \begin{cases} \max_{\theta \le \tilde{\theta}} \left\{ \pi_s(\theta)\left[-S - P(\theta)\right] + \left[1 - \pi_s(\theta)\right]\left[-P(\theta)\right] \right\} \\ \max_{\theta > \tilde{\theta}} \left\{ \pi_n(\theta)\left[-N - P(\theta)\right] + \left[1 - \pi_n(\theta)\right]\left[-P(\theta)\right] \right\}, \end{cases} \tag{5}$$

which can be rewritten as

$$\max \begin{cases} \max_{\theta \le \tilde{\theta}} \left[-p\theta - (S/r\theta)\right] \\ \max_{\theta > \tilde{\theta}} \left[-p\theta - (N/\theta)\right]. \end{cases} \tag{6}$$

The Kuhn-Tucker conditions[6] associated with the top problem in equation (6) results in a subgame perfect equilibrium, in which the terrorists choose a spectacular and the government chooses a proactive response where

$$\theta_s = \sqrt{\frac{S}{rp}} \le \tilde{\theta} = \frac{S + L - rN}{rL}. \tag{7}$$

The bottom portion of equation (6) involves a subgame perfect equilibrium where the terrorists choose a normal event and the government chooses a proactive level,[7]

$$\theta_n = \sqrt{\frac{N}{p}} > \tilde{\theta} = \frac{S + L - rN}{rL}. \tag{8}$$

If, therefore, the government wants to limit spectaculars, then it must choose a sufficiently large proactive response since $\theta_s > \theta_n$, which follows from $S/N > r$.

This is readily displayed in Figure 2 where payoffs are measured on the *y*-axis and the proactive level on the *x*-axis. The $EU^T(n;\theta)$ curve is a rectangular hyperbola with asymptotes at the two axes. When $\theta = 1$, this expected value equals N [see the right-hand side of equation (3)]. Similarly, the $EU^T(s;\theta)$ curve is a rectangular hyperbola but with a horizontal asymptote at $-L$. The critical value of $\tilde{\theta}$ corresponds to the intersection of the terrorists' expected utility curves. In Figure 2, the subgame perfect equilibrium where the government chooses a proactive level of $\sqrt{N/p}$ and the terrorists engage in a normal event is displayed by the vertical line,

where $EU^T(n;\theta)$ exceeds $EU^T(s;\theta)$. If, however, the government's proactive level of $\theta = \sqrt{S/rp}$ exceeds 1 but is less than or equal to $\tilde{\theta}$, then $EU^T(s;\theta)$ exceeds or equals $EU^T(n;\theta)$ and proactive operations are insufficient to prevent spectaculars. Without recruitment, we find that sufficient governmental offense eliminates spectaculars by weakening the terrorists so they must engage in more modest operations. In the absence of empowerment and recruitment, there cannot be too much of a good thing because proactive campaigns do not incite greater terrorism. If the government just wants to eliminate spectaculars, then it equates θ to $\tilde{\theta}$ to save on proactive costs. The reason that this is not necessarily the subgame perfect equilibrium is that the government also limits its expected losses through its proactive response; hence, its optimal choice of θ may lie well to the right of $\tilde{\theta}$ as proactive costs are traded off against reduced losses from fewer attacks. The likelihood of spectaculars are low when θ lies near to $\tilde{\theta}$.

PROACTIVE CHOICES WITH RECRUITMENT

Now we return to the game tree and allow the terrorists' payoffs at three of the outcomes to include marginal recruitment benefits $\left(c_{ss} > 0,\ c_{fs} > 0,\ \text{and } c_{sn} > 0\right)$ from a spectacular success, a spectacular failure, and a normal success. A spectacular success leads to the greatest recruitment, while the productivity for recruitment in the other two cases depends on the relative values of c_{fs} and c_{sn}. For all three cases, the heavy-handedness of the government, as measured by the size of θ, induces recruitment so proactive measures now have a downside.

Once again, we use backward induction to find the subgame perfect equilibrium for this game. Terrorists now choose a spectacular when

$$\frac{1}{r\theta}\left(S+L+c_{ss}\theta-c_{fs}\theta\right)-L+c_{fs}\theta\geq\frac{1}{\theta}\left(N+c_{sn}\theta\right), \tag{9}$$

because $EU^{T}\left(s;\theta\right)\geq EU^{T}\left(n;\theta\right),$ and engage in a normal event otherwise. Equation (9) can be rewritten as:

$$rc_{fs}\theta^{2}+\left(c_{ss}-c_{fs}-rL\right)\theta+\left(S+L\right)\geq r\left(N+c_{sn}\theta\right), \tag{10}$$

which gives two critical values $\underline{\theta}$ and $\overline{\theta}$ where equation (10) is satisfied as an equality. In Figure 3, the parabola with a *y*-intercept at $S + L$ and a minimum at $\left(c_{fs}+rL-c_{ss}\right)\big/2rc_{fs}$ corresponds to the left-hand relationship in equation (10), while the solid straight upward-sloping line with *y*-intercept at rN corresponds to the right-hand relationship in equation (10). The lower $\left(\underline{\theta}\right)$ and upper $\left(\overline{\theta}\right)$ bounds of θ distinguish the type of event chosen by the terrorists. For modest proactive levels of $\theta\in\left(\underline{\theta},\overline{\theta}\right),$ the terrorists choose a normal event, while for $\theta\leq\overline{\theta}$ or $\theta\geq\underline{\theta},$ the terrorists engage in spectaculars. To the left of $\underline{\theta}$, the terrorists execute spectaculars because proactive operations are too small to weaken them. Proactive measures are, however, sufficiently large to the right of $\underline{\theta}$ to recruit members and give the terrorists enough resources to accomplish spectaculars.

In light of the anticipated choices of the terrorists, the target government must choose a proactive response to

$$\max\begin{cases}\max_{\theta\leq\underline{\theta},\theta\geq\overline{\theta}}\left\{\pi_{s}\left(\theta\right)\left[-S-P\left(\theta\right)\right]+\left[1-\pi_{s}\left(\theta\right)\right]\left[-P\left(\theta\right)\right]\right\}\\ \max_{\theta\in\left(\underline{\theta},\overline{\theta}\right)}\left\{\pi_{n}\left(\theta\right)\left[-N-P\left(\theta\right)\right]+\left[1-\pi_{n}\left(\theta\right)\right]\left[-P\left(\theta\right)\right]\right\}.\end{cases} \tag{11}$$

Recruitment has not altered the government objective from that of equation (6), but it has altered the regions that determine the type of event. The subgame perfect equilibria to the game with recruitment can be completely specified for all values of the exogenous parameters as follows:

If $\theta_n \in (\underline{\theta}, \bar{\theta})$, then $\theta = \theta_n$ and the terrorists choose a normal event; if $\theta_n \notin (\underline{\theta}, \bar{\theta})$ and $\theta_s \leq \underline{\theta}$ or $\theta_s \geq \bar{\theta}$, then $\theta = \theta_s$ and the terrorists choose a spectacular; and if $\theta_s \in (\underline{\theta}, \bar{\theta})$ and $\theta_n < \underline{\theta}$, then $\theta = \underline{\theta}$ and the terrorists are indifferent between a normal and a spectacular.

One subgame perfect equilibrium has the government choosing $\theta = \sqrt{N/p}$ between $\underline{\theta}$ and $\bar{\theta}$ and the terrorists responding with a normal event. When the marginal costs, *p*, of proactive measures are low, a rational government may choose a proactive level above $\bar{\theta}$, hoping to make the likelihood of a successful spectacular small. Unfortunately, rational terrorists would choose a spectacular event owing to anticipated recruitment benefits. For $\theta = \sqrt{S/rp}$ between 1 and $\underline{\theta}$, the terrorists again engage in spectaculars, because they have a relatively high success probability. The government must anticipate the terrorists' derived payoffs especially from recruitment in order *not* to respond to such a degree that the terrorists are pushed to execute spectaculars with potentially disastrous outcomes. In terms of a proactive campaign, there can be too much of a good thing when it creates grievances and swells terrorists' ranks. There can also be too little proactive measures when recruitment is not significant so that the pure publicness of such actions is the main consideration. Hence, governments must choose an offensive that is neither excessive nor insufficient if spectaculars are to be avoided.

SOME COMPARATIVE STATICS

Suppose that the relative difficulty of spectaculars increases so π_n exceeds π_s by a larger amount. This is captured by an increase in *r*, which has two effects in Figure 3. First, it shifts up the straight line by increasing its intercepts while making it steeper – see dashed line $\tilde{r}(N + c_{sn}\theta)$ where $\tilde{r} > r$. By itself, this change widens the range of normal events as seen in

the diagram by the θ range where the dashed line lies above the parabola. Second, the change in *r* influences the parabola as follows:

$$\frac{\partial\left[rc_{fs}\theta^2+\left(c_{ss}-c_{fs}-rL\right)\theta+\left(S+L\right)\right]}{\partial r}=c_{fs}\theta^2-L\theta. \tag{12}$$

If the net payoff to the terrorists from a failed spectacular is negative (i.e., $L>c_{fs}\theta$), then the parabola shifts down (not shown) and this *reinforces* the increase in the range of normal events as *r* increases. When, instead, recruitment benefits are sufficiently large with failure, the parabola shifts up (not shown) and the *net* effect on the range of normal events depends on whether the shift up of the straight line exceeds that of the parabola. We again see that recruitment influences can go against conventional wisdom, because enhanced riskiness of spectaculars may not necessarily curtail spectaculars. The 1972 Munich Olympics attack sparked other attempted spectaculars, despite the improvement in commando forces – e.g., the German Grenzschutzgruppe Neun (GSG-9) – that raised *r*.[8]

Next consider an increase in c_{fs} or the marginal recruitment effect during a failed spectacular. Taking a partial derivative of the parabola with respect to c_{fs} gives $r\theta^2-\theta>0$, since $r\theta>1$. Thus, an increase in this recruitment benefit reduces the range of normal events, thereby augmenting the range of spectaculars. If c_{fs} is sufficiently raised, the parabola then lies everywhere above the straight line and *only spectaculars result.* In a real sense, martyrdom is a means of raising c_{fs} by promoting a belief that even death in attacks (successful or otherwise) has sufficient reward for the cause by attracting other zealots to engage in large-scale events with deadly consequences. Pape (2003) indicates that suicide missions kill on average 13 people, while a nonsuicide mission kill on average less than 1 person.

An increase in the marginal recruitment effect, c_{ss}, of successful spectaculars shifts up

the parabola by θ and, in so doing, decreases the range of normal events. In contrast, an enhanced marginal recruitment effect, c_{sn}, of successful normal events steepens the $r\left(N + c_{sn}\theta\right)$ straight line without altering its vertical intercept. The comparative static change equals $r\theta > 0$, so that the range of normal events widens. Obviously, these two marginal recruitment influences have opposing predictions on the range of normal events. If both c_{ss} and c_{sn} increase by the same amount, the latter influence dominates since $r\theta > \theta$ so that normal events become more prevalent. This outcome arises from the lower success probability associated with spectaculars.

An increase in S – the payoff from spectaculars in the absence of recruitment gains – raises the vertical intercept of the parabola and augments the range of spectaculars. This agrees with the earlier result regarding S when there is no recruitment; thus, the spectacular region expands with gains to a spectacular's success, regardless of recruitment.

The final comparative static change concerns an increase in L or the terrorists' loss from failed spectaculars. Taking a partial derivative of the parabola with respect to L, we get:

$$\frac{\partial\left[rc_{fs}\theta^2 + \left(c_{ss} - c_{fs} - rL\right)\theta + \left(S + L\right)\right]}{\partial L} = -r\theta + 1 < 0, \tag{13}$$

since $r\theta > 1$. In Figure 3, an increase in L augments the vertical intercept of the parabola, but shifts the parabola down and to the right so the normal range expands.

FURTHER IMPLICATIONS

Target countries have different abilities to counter terrorism, which affect their *marginal proactive costs* (p). To put things in perspective, we assume that one country – say, the United States (US) – has a lower p than another target – say, the EU – but are identical in terms of other parameters. This cost difference may stem from the US having better technology or intelligence

to counter terrorism. *Ceteris paribus,* a low *p* encourages a larger proactive response. This scenario is depicted in Figure 4 for the parabola and straight line whose intersection delineates normal events for $\theta \in \left(\underline{\theta}, \overline{\theta}\right)$ from spectaculars outside these bounds. In Figure 4, the small *p* for the US encourages sufficient proactive measures to trigger a spectacular owing to terrorist-perceived recruitment gains. In contrast, the EU's high *p* limits its proactive operations and results in a normal event.

If the United States places a high value on terrorism-related losses (*S*) from a spectacular, or the terrorists value comparable US losses over those from other countries, then this also raises the level of US proactive measures by raising *S*, thus increasing the likelihood of spectaculars against US interests. Targets such as the World Trade Center (WTC) had a high *S* value owing to the potential loss of life, its symbol of US dominance in globalization, and its potential financial consequences. Given the failed attempt in 1993 to bring down the north tower of the WTC, the *S* value was particularly high.

In fact, the scenario depicted in Figure 4 appears to capture US and EU reactions following 9/11. Because US losses from 9/11 far exceeded those of any other country, the Bush administration and the American public clearly put very high values on future losses – understandably, *S* increased in relation to that of countries less harmed by 9/11. This characterization of US perceptions is consistent with survey findings reported by Davis and Silver (2004) in which Americans felt sufficiently threatened after 9/11 to sacrifice some civil liberties for greater security. US superiority in military power and intelligence compared with other target countries also made for a relatively low *p*. Past and current US efforts to secure its borders and guard against terrorist attacks lowered *p* relative to other countries, which increased US proactive response and promoted further spectaculars – e.g., the attempted shoe bombing by

Richard Reid of American Airlines flight 63 on 22 December 2001, en route to Miami from Paris.[9] A sizable portion of proactive spending gets included in a country's military budget. Unlike most European countries, the US defense budget grew greatly following 9/11. A recent study of the composition of terrorist events indicates that the proportion of deadly bombings has increased greatly since 9/11 and the subsequent US-led war on terror (Enders and Sandler 2004). This suggests that a greater reliance on proactive operations may be encouraging deadlier attacks.

There is an interesting transnational externality associated with our analysis. Insofar as terrorists stage their attacks where targets are softer, US proactive measures are apt to result in spectaculars against US interests being staged abroad where defensive measures are inferior to post-9/11 measures in the United States. Thus, the US war on terror has implications for countries not part of this effort, because greatly elevated US proactive measures can deflect spectaculars to these countries. Examples include the simultaneous bombings of two Bali nightclubs killing foreigners including Americans on 12 October 2002, and the simultaneous truck bombings of a residential complex in Riyadh, Saudi Arabia, housing foreigners including Americans on 12 May 2003. Typically, proactive measures are viewed as being undersupplied owing to their purely public good representation (see, e.g., Sandler and Siqueira 2003), where only external benefits are derived by other countries. The analysis here indicates that such actions can also create external costs as spectaculars are encouraged and shifted abroad. If proactive policy implies both external benefits and external costs, then its supply can be too little, excessive, or just right. When external benefits dominate, a proactive response is undersupplied; when, however, external costs dominate, a proactive response is oversupplied. In the unlikely event that external benefits exactly match external costs, proactive policy is optimal despite the provider acting independently.

There is one consideration that may curtail excessive proactive measures by a nation with a low p and high S. Even though the attacks may be shifted abroad, the terrorists still target some of the offensive country's assets. If the latter incorporates these costs on its interest abroad in its calculus, then it will curtail its proactive response somewhat. Any internalization of these external costs will, however, be incomplete, because the host country's losses are unlikely to influence the proactive country's decision. For example, on 20 November 2003, two massive suicide truck bombs exploded at the British Consulate and the British HSBC bank headquarters in Istanbul, Turkey. Although the bombs were against British interest, all but three of the 30 or so dead were Turkish Muslims.[10] As attacks are transferred abroad, host countries sustain collateral damage, ignored by the proactive country when deciding its counterterrorism policy.

CONCLUDING REMARKS

If proactive measures are cheap or if the perceived costs of future attacks are high, the subgame perfect equilibrium may involve a targeted government engaging in relatively large amounts of proactive operations that induce terrorists to resort to occasional spectaculars to tap into recruitment benefits. Unquestionably, the experience of 9/11 raised S for the United States, whose marginal proactive costs are relatively low compared with other countries. Since 9/11, the relatively large US proactive campaign is consistent with the model presented and may be excessive from a global standpoint as transference externalities imposed on other countries are not taken into account when the United States decides its proactive options. As a consequence, there may indeed be too much proactive operations with unintended fall-out.

Although this paper has focused on a two-player game between the terrorists and a targeted state, an n-player game underlies proactive decisions where players consist of the $n-1$ possible target nations and the terrorist network. In choosing their proactive measures, the

targeted states fail to adjust for the externalities that they impose on one another, which then allows the terrorists to exploit vulnerabilities from states' uncoordinated actions. If resources are to be allocated efficiently to counterterrorism, nations must act in unison. The international community is far from accepting this basic insight.

Footnotes

1. This percentage is computed from Sandler (2003, Table 1), whose data comes from the Department of State.

2. Spending on terrorist-related intelligence is not available.

3. This analysis differs from Sandler and Arce (2003), which only allowed for a discrete choice of preemption but permitted a three-player interaction involving two targeted governments and a terrorist group.

4. By equation (4), we have $\frac{S+L-rN}{rL} \geq 1$ or $r \leq \frac{S+L}{N+L}$, from which $S/N > r$ follows because $\frac{S}{N} > \frac{S+L}{N+L}$ when $S > N$ and $L > 0$ as assumed.

5. These comparative static results depend on:

$$\frac{\partial \tilde{\theta}}{\partial L} = \frac{rN-S}{rL^2} < 0 \text{ and } \frac{\partial \tilde{\theta}}{\partial r} = \frac{-L(S+L)}{(rL)^2} < 0.$$

The first inequality follows from $S/N > r$.

6. The Lagrangian is $\left(-p\theta - \frac{S}{r\theta}\right) + \lambda\left(\tilde{\theta} - \theta\right)$,

where λ is a nonnegative Lagrangian multiplier. The first-order Kuhn-Tucker conditions satisfy:

$$-p + \left(S/r\theta^2\right) - \lambda = 0 \text{ and } \theta > 0,$$

and

$$\left(\tilde{\theta} - \theta\right) \geq 0 \text{ and } \lambda \geq 0.$$

7. The Lagrangian is $\left(-p\theta - \frac{N}{\theta}\right) + \lambda\left(\theta - \tilde{\theta}\right)$ and the relevant Kuhn-Tucker conditions

give equation (8) since $\lambda = 0$ and $\theta > 0$.

8. The GSG-9 pulled off a daring rescue mission of hijacked Lufthansa flight 181, while it was on the ground in Mogadishu, Somalia, on 18 October 1977. The rescue mission freed the hostages with just minor injures to four hostages (Mickolus 1980, 734-40). Stun grenades were used to gain a jump on the terrorists. Clearly, *r* had risen after Munich.

9. In Figure 4, a reduced *p* shifts $\theta = \sqrt{S/rp}$ to the right.

10. The blast at the Consulate killed the UK Consul General Roger Short, 58.

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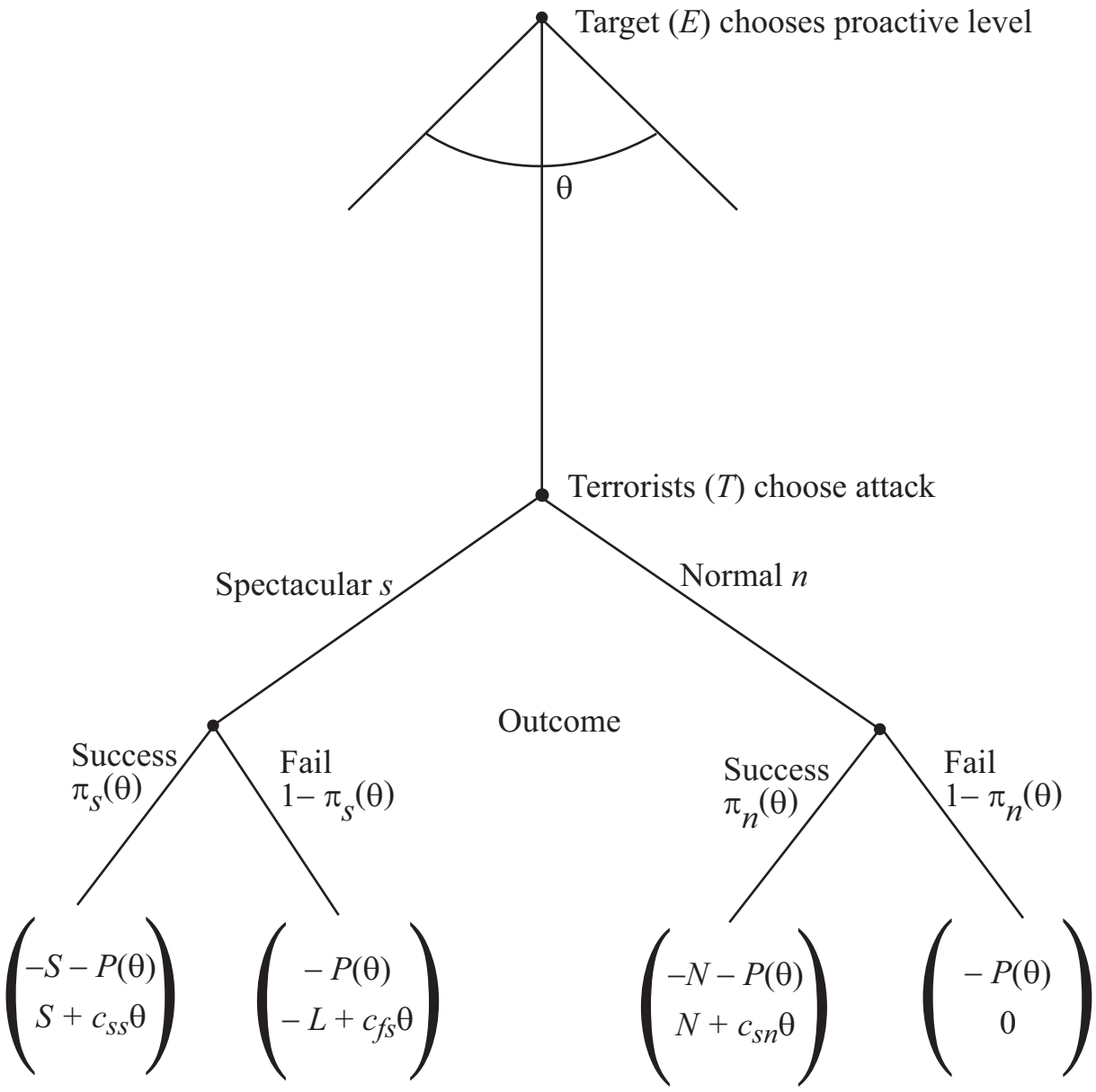

Figure 1. Proactive response game tree

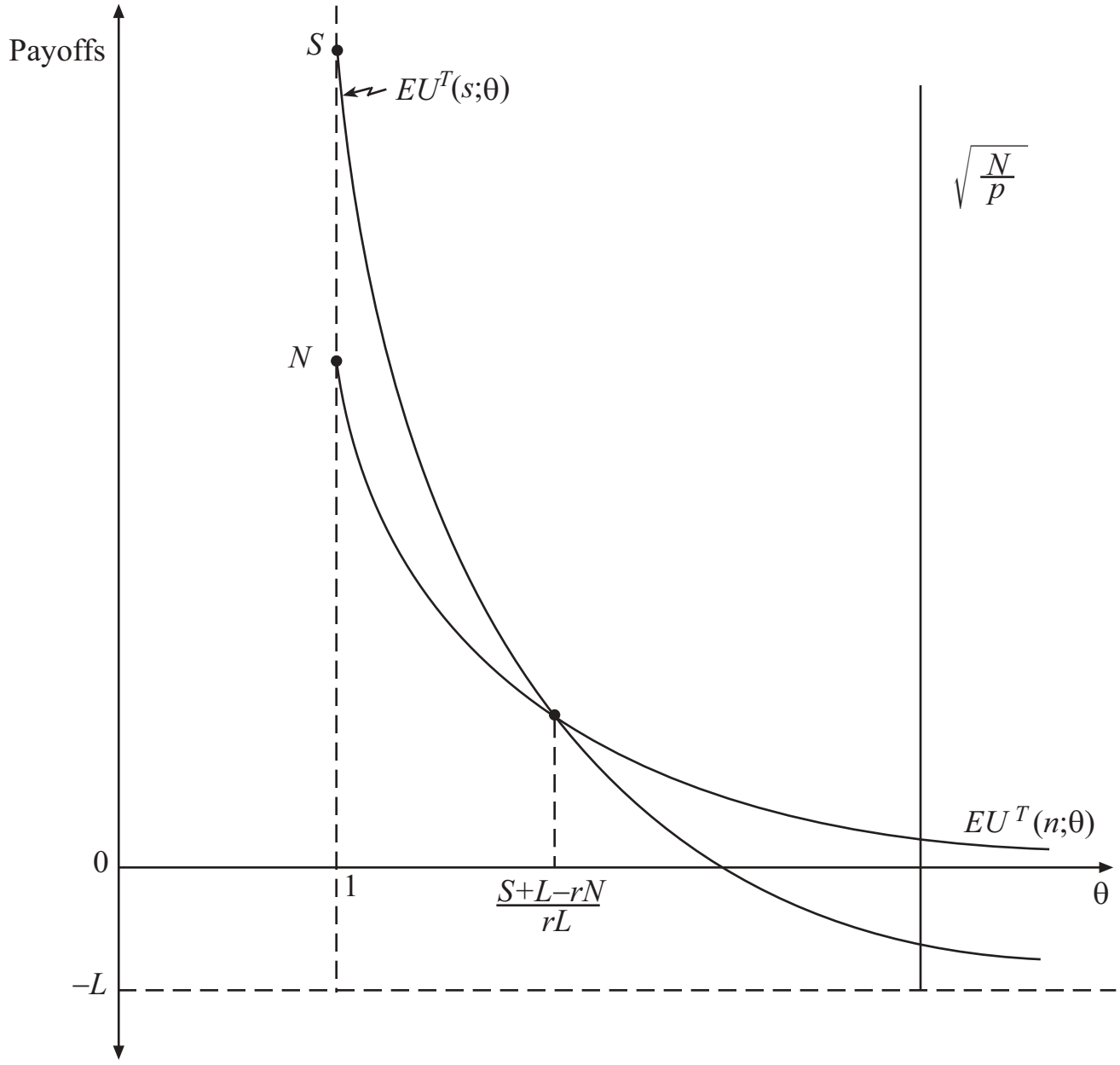

Figure 2. Payoffs in the no recruitment game

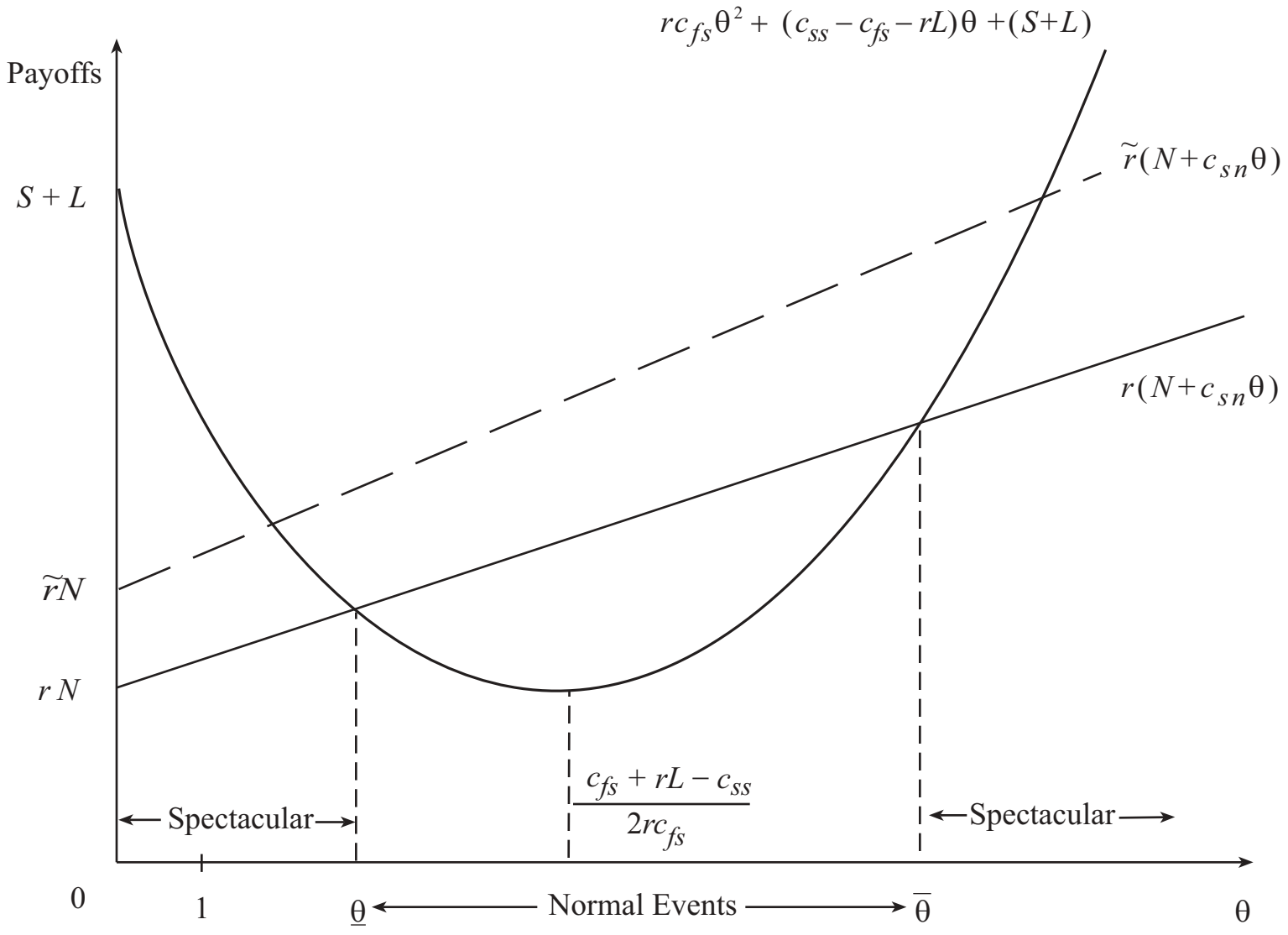

Figure 3. Terrorists' choice of event with recruitment

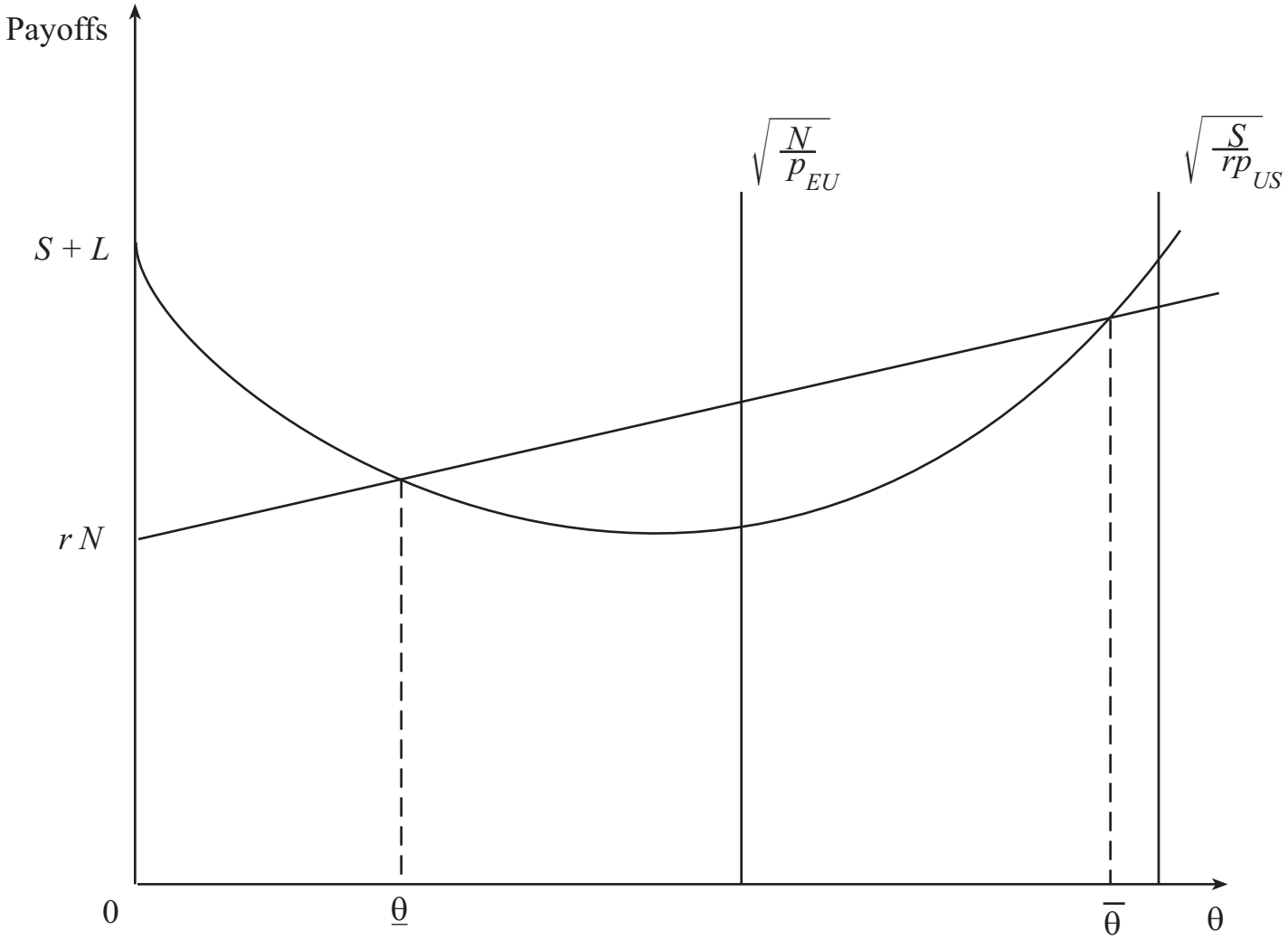

Figure 4. Different outcomes for targets