Example 8.2
The Economics of Terrorism: Externalities and Strategic Interaction

ECONOMIC APPROACHES TO TERRORISM: AN OVERVIEW

Terrorism would appear to be a subject for military experts and political scientists, but economists have long had an interest in terrorism as well. As it happens, a number of economic models and methods of analysis are helpful in understanding some important dimensions of terrorism. A short list would include the following.

Game theory

Game theory models strategic interactions between limited numbers of agents, and two kinds of strategic interactions are central to the analysis of terrorism. The obvious one is the strategic interaction that occurs between a terrorist group and a country that is trying to defeat it or at least limit its effectiveness. But another important set of strategic interactions occurs between different countries finding themselves under terrorist attack. These interactions arise because a move by one country against a terrorist group typically generates external effects on other countries, both positive and negative. The externalities arise because terrorist groups often target more than one country. The positive external economy is that a successful move against a terrorist group by one country can reduce its ability to attack other countries. The negative external diseconomy is that a move by one country against a terrorist group that limits its ability to attack targets in that country may cause the terrorist group to focus its attacks on targets in other countries. The strategic interactions among the countries in fighting terrorists depend on whether the external effects are positive or negative, and the exact form that they take.

The economic problem

The fundamental economic problem consisting of objectives, alternatives (choices), and constraints is a useful way to model terrorist behavior, assuming that the terrorists are rational. All three elements of the problem point to a number of intriguing questions and

possibilities that are important in understanding terrorist behavior. Are the objectives and motivations of a particular terrorist group political in nature? Or religious? Nihilistic? Something else? Most terrorists also lead conventional day-to-day lives; they have families and are employed in regular jobs. How does the utility they receive from their non-terrorist activities compare with the utility they receive from their terrorist activities? Terrorist groups typically have a large number of options to choose from. They can engage in many different kinds of activities – hostage taking, skyjacking, bombing, biological attack. Also, as noted, they can attack targets in many different countries, either serially or simultaneously. How does each option promote their objectives? Their constraints depend on the amount of resources they have and the relative costs of their various options. Moreover the actions taken by countries against the terrorists can affect the relationship between their alternatives and constraints by changing the costs of the various options (for example, airport metal detectors have raised the cost of skyjackings). They can also change the relationship between terrorists' alternatives and their objectives by changing the amount of utility terrorists receive from the various options. An example would be the promotion of economic development in countries that contain terrorist groups, resulting in better conventional job opportunities for terrorists.

Cost-benefit analysis

The methods of cost–benefit analysis can be used to frame the net benefits from moving against a terrorist group. Enumerating the costs of various actions against the terrorists is reasonably straightforward, but the benefits of reducing terrorist activity are another matter entirely. They involve such difficult issues and questions as:

- Determining the value of saving human lives and of reducing fear among the population
- Assessing whether limiting the threat of one type of terrorist activity (such as skyjacking) will lead the terrorists to increase other types of activities (such as hostage-taking or bombings)
- Considering how attacks on densely populated urban areas will ultimately affect the location of businesses and people in the medium and long term. For example, will there be a flight of both to the suburbs and rural areas to reduce the incentive for terrorists to attack?

Economists have developed techniques to place monetary values on non-marketed effects such as reduction in the probability of death or of fear (some of these are discussed in Chapter 20 of the text). Also, urban economists have developed complex models of the factors that determine the location of businesses and people throughout metropolitan areas – models that can be applied to predict the response to terrorist attacks.

Empirical analysis

Finally, economists have used empirical analysis to characterize the pattern of terrorist activities over time and how the pattern has been affected by countries' actions against them. The analysis has uncovered three main patterns in terrorist activity over the past 40–50 years: it has steadily declined over time, it tends to move in cycles around the downward trend, and it has become more lethal.[1] The analysis attempts to answer such questions as whether the actions of the countries against the terrorists tend to generate the cyclical pattern and whether the increased lethality of the attacks depends on a change over time in the motivations of the terrorist groups (religious motivations appear to be replacing narrow political motivations).

Within this rich menu of possibilities for discussion, this example explores how the nature of the externalities generated by countries' actions against terrorist groups can affect the strategic interactions among the countries. The main question is whether countries will cooperate in the fight against terrorism.

POSITIVE EXTERNALITIES AND THE INCENTIVE TO FREE RIDE

To begin, suppose that the external effects of any one country's actions against a terrorist group are all positive. This might be the case if the terrorist group is willing to attack targets in a number of countries without necessarily favoring any one country. If so, then an action by any one country that either destroys the group or reduces its ability to strike has the attributes of a nonexclusive good: effective action against the terrorists by any one country benefits all countries, more or less equally. As with all nonexclusive goods, this generates a strong incentive for each country to free ride on the actions of the other countries. If the incentive to free ride is strong enough, it can lead the countries into a Prisoners' Dilemma in which no action is taken against the terrorist group even though it is in each country's best interest for all of them to cooperate and act against the terrorist group.

The Prisoners' Dilemma was named after a situation in which two criminals are deciding whether or not to confess to a crime. If neither confesses they both go free, which is clearly their preferred solution. If either or both confess they both go to jail, but the length of the jail terms depend on who confesses. Call the two prisoners X and Y. If both prisoners confess, they get medium-length jail terms. If X confesses and Y does not, then X gets a short jail term as a reward for confessing and Y gets a long jail term as an additional punishment for lying. The reverse is true if Y confesses and X does not. If

[1] The 9/11 attack against New York's World Trade Center and the Pentagon is a decided outlier in terms of terrorist lethality. More people died in that attack than in all the terrorist attacks worldwide from 1988 to 2001. However, the increase in lethality over time is evident even if the 9/11 attack is removed from the data.

neither prisoner is sure what the other will do, then the equilibrium of this game is that both confess, even though the 'efficient' solution from the prisoners' point of view is that both do *not* confess.

The Prisoners' Dilemma can be applied to two countries, again X and Y, which are deciding whether to act against a terrorist group that is affecting both of them. The following table gives the payoffs to each. X and Y have two options: act (A), or do not act (DN). X's options are listed down the side of the table and Y's options along the top. The payoffs for X and Y for each of the four possibilities are given in the cells of the table, with X's payoff listed in the bottom right of the cell, and Y's in the top left. The payoffs are given an ordinal ranking, with 4 the best and 1 the worst.

		Y	
		A	DN
X	A	Y: 3 X: 3	Y: 4 X: 1
	DN	Y: 1 X: 4	Y: 2 X: 2

The bottom right hand cell gives the payoffs when neither acts and the status quo is maintained. It is the second worst outcome for each (2, 2). The top right hand cell gives the payoffs when both act. It is second best for both (3, 3) and involves the maximum overall reduction of the terrorist group's capabilities– but each country bears the costs of acting. The bottom left hand cell gives the payoff when Y acts but X does not. This is the best outcome for X. The payoff assumes that the external effect of Y's action is highly positive for X, yet X does not have to bear any cost to receive the benefit. It 'free rides' on Y's action. At the same time, this is the worst payoff for Y since Y does not enjoy as much protection by acting on its own as it would have if X had acted as well, and it has to bear the costs of acting. The payoffs are symmetric if X acts and Y does not, as given by the upper right-hand cell.

Suppose X is unsure what Y will do. If X assumes that Y will act, its best response is not to act (because 4>3). If X assumes that Y will not act, then its best response is not to act (because 2>1). Therefore, its best response is not to act, no matter what Y does. Y reasons the same way, so it does not act either. Therefore, the only equilibrium in this game is [DN, DN] with payoffs of 2, 2 – even though each would be better off if both acted. The conclusion is that the positive externalities from any one country's action tend to generate too little deterrence against terrorist groups.

POSITIVE BUT UNEVEN EXTERNALITIES

The terrorist group al Qaeda allegedly has cells in at least sixty countries, so it is tempting to conclude that countries decided to free ride on the U.S. efforts to go after the heart of the al Qaeda network after 9/11, first in Afghanistan and then in Iraq. But that is not exactly what happened. Another major power, the United Kingdom, agreed to join the U.S. in the effort. The British lost a number of their citizens on 9/11 and decided, along with the Americans, that they had much to gain from trying to weaken or defeat al Qaeda, more so than any other country besides the U.S. Therefore, although there were widespread externalities from the U.S.'s action, they were far more uneven than the non-exclusive good model would suggest.

When two countries have much to gain from action against a terrorist group, it directly affects their strategic interaction. The game between them can change from the Prisoners' Dilemma to the so-called 'Assurance game', with the payoffs listed in the following table. The UK is listed across the top and the U.S. down the side.

		UK	
		A	DN
US	A	UK: 4 US: 4	UK: 3 US: 1
	DN	UK: 1 US: 3	UK: 2 US: 2

The difference between the Assurance game and the Prisoners' Dilemma is that the two highest outcomes, 3 and 4, are reversed. Each country gains the most from cooperative action, shown in the top left hand cell with a payoff of 4, 4. Having the other country act alone now takes second place for each country, because both are clearly major targets of al Qaeda. Neither gains quite as much by avoiding the costs of acting. The status quo of each not acting is again the second worst outcome for both. The worst outcome remains acting when the other country does not, because the fight against al Qaeda is less effective than when both act and the country that acts bears all the costs.

This game has two equilibria. Suppose, again that the UK does not know what the U.S. will do. If the U.S. acts, the best strategy for the UK is to act (because 4>3). If the U.S. does not act, the best strategy for the UK is not to act (because 2>1). The U.S. reasons the same way, so the outcomes can either be A, A or DN, DN. The game is called the Assurance game because one country knows that if it takes the lead the other will follow, which is exactly what happened. The U.S. took the lead and acted because it took such a direct hit on 9/11, and the UK followed immediately behind.

NEGATIVE EXTERNALITIES

The strategic interactions between countries can take quite different paths if an action against a terrorist group by a country generates negative externalities by increasing the likelihood that the terrorists will now focus their attacks on other countries. This time let Y be the primary target of the terrorists and X be a secondary target that the terrorists will turn against if Y acts against them. In addition, assume that Y has been hit hard enough that it has resolved to act against the terrorists no matter what X does. The payoffs in this case might look as follows, with X's options listed down the side of the matrix and Y's options along the top of the matrix.

		Y	
		A	DN
X	A	X: 4, Y: 4	X: 2, Y: 2
	DN	X: 1, Y: 3	X: 3, Y: 1

Y is best off if both countries act, but now second best off if it acts alone. Its payoffs for not acting (2 and 1) are not of interest because its best response is to act no matter what X does. The question is what X will do given the negative externality arising from Y's action. If Y acts, X's best response is to act to avoid the negative externality (4>1). If X does not act, it bears the negative externality of attacks on its soil, which is its worst-case scenario. If Y does not act, then X's best strategy is not to act either, since Y remains the primary target (3>2). By acting, it reduces its threat but bears the costs of acting, so that not acting is the better option. Therefore, both countries end up cooperating in acting against the terrorist group, even though X would prefer not to act if Y did not act. This may explain why a number of other countries joined the U.S. and the UK in Afghanistan and Iraq in their battle against al Qaeda, although admittedly their efforts were minimal in most cases – so much so as not to differ all that much from free riding on the U.S.–UK efforts.

PAID RIDING

The negative externality on X raises another possibility: X can provide a sanctuary for the terrorist group on the condition that the group will not attack targets in X. Dwight Lee refers to this as paid riding, because X extracts a rent from the efforts of Y against the terrorists. The payoff matrix with paid riding (PR) by X as a third possibility might look

as follows. Again X's options are listed down the side of the matrix and Y's options along the top.

		Y	
		A	DN
X	A	Y: 6 X: 5	Y: 4 X: 2
	DN	Y: 5 X: 1	Y: 3 X: 3
	PR	Y: 1 X: 6	Y: 2 X: 4

Now there are six rankings to consider. As before, the top two outcomes for Y occur if X chooses either to act or not act. But if X chooses to offer sanctuary to the terrorist group, then acting becomes the worst outcome for Y: Y bears the cost of acting, but loses most of the benefits because X is protecting the terrorists. From X's perspective, the best outcome is to provide sanctuary when Y acts, because then it is safest from attack. The terrorist group has been weakened somewhat by Y's actions and it has agreed not to attack X. Its second best outcome, however, is to act if Y acts since it benefits from the weakening the terrorist group. And, as above, its worst outcome is not to act if Y does since X bears the full brunt of the negative externality. If Y does not act, then X's best option is still to provide sanctuary to the terrorists. It does not cost anything and it protects X from terrorist attacks. Therefore, X engages in paid riding no matter what Y does. Knowing this, Y chooses not to act because not acting is better than acting when X engages in paid riding (because 2>1). Why waste resources by acting against the terrorists if X offsets most of the benefits by providing sanctuary for the terrorists? The combination PR, DN is a terrible outcome for Y and not the best outcome for X. But it is the only equilibrium solution to this game given the benefits that X gets from paid riding to counteract the negative externalities of Y's acting against the terrorists.

Providing sanctuary to terrorist groups is a risky business, of course, since the terrorists may eventually renege on their promise not to attack targets in X. And whether the terrorists renege or not, it greatly strengthens the hand of the terrorists against other countries. Paid riding is a very destructive response to the negative externalities, and inherently non-cooperative. Whether it is a realistic possibility depends on the countries and terrorists involved. Israel, for example, would never provide sanctuary for Islamic terrorist groups since these groups' promises not to harm Israel are not credible. But France has provided sanctuary for Basque terrorists so that they would not attack French targets – much to the distress of Spain, the primary target of the terrorists.

In sum, these examples reveal that the presence of cross-country externalities is a tremendously complicating factor in trying to reach a coordinated effort against terrorist attacks. Almost any outcome is possible depending on the goals of the terrorists and nature of the externalities, from full cooperation against the terrorists to no action at all.

ALTERNATIVES TO DETERRENCE

One concluding comment is in order. The examples discussed above all assume that deterrence of some kind is an effective strategy against terrorist groups, in the sense that deterrence always yields high-aggregate net benefits if both countries cooperate. In truth, however, deterrence has typically been ineffective against terrorist groups – so much so that Bruno Frey argues for a completely different approach. He favors non-deterrence strategies that reduce the utility that terrorists receive from terrorist activity, either by reducing the benefits directly or by increasing the opportunity cost of such acts by raising the utility to the terrorists of non-terrorist activity.

An example of the former is for the media not to attribute an attack to any one group, even if it strongly suspects who did it, saying instead that it could have been perpetrated by one of any number of groups. Frey justifies this approach as an extension of the innocent-until-proven-guilty principle rather than an attempt to limit the media's freedom of expression, and one that has the advantage of sharply reducing the gains to the terrorists of launching attacks. They want as much media attention as possible to spread fear among the population.

An example of the latter is inviting terrorist leaders to participate in forums in which they can present their ideas, and even allowing them to participate in elections. This strategy worked for the British in bringing peace in Northern Ireland and thereby ending the terrorist attacks against targets in England by the IRA. Another option is to sharply reduce the criminal penalties faced by terrorists who repent, leave the terrorist group, and provide authorities with information about the group. The Italians have used this strategy effectively against the Brigate Rosse (Red Brigades).

These strategies raise the opportunity cost of terrorist activities without incurring the costs associated with the deterrence approach. One set of costs, already noted, are the negative externalities when deterrence by one country causes terrorists to attack targets in other countries. Another important cost is that deterrence invariably comes with some restrictions on the freedom and civil liberties for the citizens of the deterring country, such as taps on their telephone and e-mail communications. Frey concedes that people may well recoil from the thought of granting favors to terrorists and providing an audience for their views, but he believes that these kinds of measures have proven to be the only effective strategy against terrorist activity. As such, they generate a positive sum game between countries and terrorist groups rather than the negative sum game of the deterrence approach.

Whatever approach one chooses to follow, there is no escaping the conclusion that terrorist activity presents highly complex and challenging problems for any country that tries to protect itself against attack.

Sources

T. Sandler and W. Enders, "An Economic Perspective on Transnational Terrorism," *Working Paper*, February 2002 (An excellent overview of the economic issues associated with terrorism, complete with an extensive list of references--a good place to begin. They describe the Assurance game. Also, the data on the extraordinary lethality of 9/11 are on pp. 3 and 4.)

D. Lee, "Free Riding and Paid Riding in the Fight Against Terrorism," *AEA Papers and Proceedings*, May 1988. (The analysis of negative externalities and paid riding draw heavily from this paper.)

B. Frey, "How to Deal with Terrorism, " *Economists' Voice*, August 2006

B. Frey and S. Leuchinger, "How to Fight Terrorism: Alternatives to Deterrence," *Working Paper*, Institute for Empirical Research in Economics, November 19, 2002. (The Italian response to the Red Brigades is on p. 12.)