

# On The Effectiveness of Counter-Terrorism Measures - A Political Economy Perspective

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### **Abstract**

This paper presents models to evaluate the effectiveness of counter-terrorism measures from a political economy perspective. Simple, yet rigorous microeconomic tools are presented and practical intuition is shown using real life examples from the Israel-Palestinian conflict. When we assume rational actors who face a certain maximization problem within our models, terrorists' responses to certain counter-measures will be predictable. This paper will show that the political economy approach can provide significant insight to the research of effective counter-terrorism measures.

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# 1 Introduction

The study of terrorism and its counter-measures has been a vastly researched academic field. Enders and Sandler (2006) say that, emerging as a field of research for political scientists in the 1970s, Brophy-Bearmann and Conybeare (1994) were the first political scientists to quantitatively examine the effectiveness of anti-terrorism measures. Thereafter, it was Bueno de Mesquita (2005) who firstly introduced a rational choice model to the study of terrorism. Since then, economists have devoted themselves to this field, applying instruments from classical economics theory such as game theory, budget constraints, individuals' maximization problems and statistical empirical research methods to the research of the effectiveness of counter-terrorism measures. A milestone at that point has been Landes (1978) who examined the effectiveness of the introduction of metal detectors at US airports as a counter-terrorism strategy, finding that while the number of hijackings has declined, the number of diplomat kidnappings and other forms of terrorism have actually increased. With classical economic theory, he explains this phenomenon - the "transference" - with terrorists' budget constraint and their maximization problem, when the costs of a specific form of terrorism increases while the likelihood of a successful outcome decreases, terrorists shift their actions to other forms of terrorism. Other research on the economics of terrorism has been undertaken by Todd Sandler and Walter Enders who, among others, dedicated their research effort to the exploration of the effectiveness of counter-terrorism measures and the economics of terrorism in general. This field has experienced another boost after the terror attacks on the world trade center in New York on September 11th in the year 2001 (Gearty, 2005). Many frequently cited academic journals have emerged, such as *Terrorism and Political Violence* or *Studies in Conflict and Terrorism*. But the research field of the effectiveness of counter-terrorism measures remains active, since there are many collective action problems associated with the ways in which governments decide on their counter-terrorism measures (Arce and Sandler, 2005). A liberal democracy's duty is to protect its citizens, and ensure their safety and grant civil and political rights. Wilkinson (2006) says that the government of a liberal democracy rules by the mandate of its citizens, and when periodical elections take place, a government can be voted out of office. For exam-

ple, if a government is unable to protect its citizens from terrorist attacks, that government will appear weak and incapable of fulfilling its duty to ensure public safety. Thus, countering terrorism activities is a crucial task of a government where the public is threatened by terrorism (Wilkinson, 1977). This is one of the reasons why, for governments trying to counter terrorism, the research of the effectiveness of counter-terrorism measures is so important.

The goal of this paper is to examine the effectiveness of counter-terrorism policies from a political economy perspective. For that purpose, the paper is divided into two parts. In the first part, a selection of basic economic models is presented and its ability to assess the effectiveness of counter-terrorism measures is discussed. In the second part, the models presented in the first part are connected to real world examples from the Israeli-Palestinian conflict to see what the models presented in section one imply for the effectiveness of the counter-strategies for those real world examples.

This paper particularly stresses the evaluation of effectiveness from the political economy perspective in contrast to the classical political sciences approach. In my opinion, when methods of originally different fields are applied to a different field of research, this can yield new insights and support the evolution of that science.

The Israeli-Palestinian conflict is selected here because counter-terrorism measures by the Israeli government present a specifically interesting example since the Israel-Palestinian conflict lasts way back decades, with regular terrorist attacks on the Israeli public undertaken by Palestinian terror groups such as Hamas and others<sup>1</sup>. Also, the Israeli government and its military are active in countering those attacks, and therefore a scientific approach to the right counter-measures seems particularly appropriate. Examples include for instance the destruction of suicide terrorists' families' houses by Israeli military forces. This example has a clear game theoretical aspect: Azam (2005) introduced suicide terrorism as a form of inter-generational investment, that is, agents of the current period give up consumption for future generation, since it has been proven that often, the fam-

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<sup>1</sup>See RAND database graphs on page 31.

ilies of suicide terrorists receive a form of remuneration. Because the Israeli military usually tries to destroy the houses of suicide terrorists' families, according to Azam, this is a reduction of the benefits of the agent (here: the suicide terrorist) and its benefits for the outcome of the game.

## **2 Economics Approach to the Study of Counter-Terrorism**

### **2.1 The Political Economy Perspective**

Since this paper is about the effectiveness of counter-terrorism policies from the political economy perspective in clear contrast to the original political sciences approach, the political economy perspective has to be well defined before introducing any theory.

#### **Political Economy**

Mill (2006) describes political economy as the application of classical economics tools and methods to the research of political topics. According to Persson and Tabellini (2000), political science and economics both study collective choice and institutions. They say, the ultimate goal of political economy is to understand how policy decisions are made and what the policy makers incentives and constraints are. So according to Persson and Tabellini, political economy uses the main tools of analysis from economics to model policy choices as the equilibrium outcome and specific strategic interactions between rational individuals. Among those commonly used economic tools are agents' maximization problems where budget constraints, indifference curves and payoffs are modeled, substitution effects, complements to actions, Prisoners' Dilemmas or other game theoretical models (Arce and Sandler, 2005). Whenever economics tools are used, they can be quantitative and qualitative. According to Enders and Sandler (2006), the quantitative approach can include rational choice theories backed by statistical inference, when specific phenomenons are proven by a statistical analysis of datasets. Thus, economists are able to make precise mathematical statements about a relationship of certain variables. Economists have used these methods to examine cycles of terror attacks in

combination with election dates<sup>2</sup> or to identify cycles to predict terror attacks and counter-activities, like in a prominent paper by David A. Jaeger and M. Daniele Paserman (2008). By systematically identifying patterns, these insights can help to select the most appropriate counter-terrorism measures. Like Persson and Tabellini describe, the main difference between the political economy approach and the political science approach are the different tools that are applied by the respective disciplines. This is also the main advantage in contrast to the classical political sciences approach. Within the rational actor depiction, economists and later political scientists have applied game theoretical models to the study of terrorism<sup>3</sup>. That is, rational decision making in a strategic interactive framework where agents (in the present case: terrorists and governments) are described as rational actors with certain budget limitations and costs and benefits of their undertaken actions (Enders and Sandler, 2006). In this framework, terrorists are portrayed as calculating individuals who optimize some goal subject to a certain budget constraint (Arce and Sandler, 2005). This perspective also includes the insight that, if the specific variables are known, terrorists act in a predictable manner. Therefore, we will observe a shift in terrorists' global optimum when variables are changed in a way that the budget constraint shifts. So terrorists reconsider their optimal feasible set of actions as described in Enders and Sandler (2006). This phenomenon is called "transference" (Landes, 1978) and it is widely observed in reality today, however it was well discussed when the game theoretical approach was firstly introduced.

### **Political Science**

The political economy perspective clearly distinguishes itself by using economic tools in contrast to mainly qualitative research as used in political science research on terrorism, where the focus is on social, psychological and political explanations (Enders and Sandler, 2006). According to Enders and Sandler, political sciences apply rather a multidisciplinary comparative analysis of terrorist campaigns, groups, tactics, motives, finances, state support and trends .

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<sup>2</sup>For example Berrebi and Esteban (2006) for Israel and Hodler and Rohner (2010) for Spain.

<sup>3</sup>Among these early game theoretical analysis were Lapan and Sandler (1988, 1993), Overgaard (1994) and Selten (1998).

But the classification is not always clear because also political scientists have used game theory, which is also a commonly applied tool in economics (de Deugd and Hoen, 2010).

### **Rationality**

Since the political economics approach is fundamentally based on the assumption of rational actors (Persson and Tabellini, 2000), the question arises if actors in this framework are indeed entirely rational. This paper is about the effectiveness of counter-terrorism measures from the political economy perspective, and therefore we have to discuss rationality within a political economy approach to the study of counter-terrorism.

The assumed rationality of the parties is a primary point of critique (Harrison, 2006). According to Enders and Sandler (2006), rationality in economic theory is not judged by an agent's goals or by socially acceptable behaviors, but rather by the manner of how an agent reacts to environmental and other constraints. One might seriously doubt the rationality of the very act of killing oneself for a political or religious concern. How can we assume rationality when terrorists carefully plan and execute a mission which ends with their own demise? Many scholars therefore argue that due to the irrational nature, the political economy perspective has no fundament and may not be applied to analyze the effectiveness counter-measures (Berman and Laitin, 2005 and Windrobe, 2001). However, there are many scholars who have provided reasonable models to seriously assume a rational behavior of terrorists. Windrobe (2002) argues that suicide missions can be rational if the utility of that mission is higher than living with the current state. The question is rather why certain individuals might gain utility from a suicide act. Windrobe supports the argument that terrorists belong to a certain group and feel solidarity to that group. In extremist groups, a belief system exists that entails the willingness to sacrifice himself for the group. The act of suicide therefore is a "corner solution", meaning that the suicide terrorist sacrifices everything in solidarity to the group. In addition to Windrobe's work, Azam (2005) has modeled suicide terrorists as altruists who highly value future payoffs for their next generation. If we advocate the rationality of terrorists, there must be explanations for suicide bombers which are

rationality-based. Azam suggests a model where suicide bombers apply a kind of inter-generational investment. That is, a suicide terrorist sacrifices his own life for a higher cause so that the future generation can benefit from his self-immolation. Other scholars provide suicide terrorist's letters that have been found and released as a proof for the rational nature of their acts, such as: *"Dear family and friends! I write this will with tears in my eyes and sadness in my heart. I want to tell you that I am leaving and ask for your forgiveness because I decided to see Alla' today and this meeting is by all means more important than staying alive.* (from: Maariv, 1994, p. 15 cited in Ganor, 2000).<sup>4</sup>

## 2.2 Defining Terrorism, Counter-Terrorism and its Effectiveness

To answer the question how the effectiveness of counter-terrorism measures can be assessed from a political economy perspective, terrorism, counter-terrorism and their effectiveness have to be well defined.

### Terrorism

Terrorism and its counter-measures are topics that have been discussed a lot during the past decades. Terrorism is in everyday's media, in politics and it is also also an active field of academic research. Many different definitions of terrorism can be found in official use, however we need a well-defined notion in order to classify events as terrorism for quantitative and qualitative research. The US Department of State for example uses the following definition: "Terrorism means premeditated, politically motivated violence perpetrated against noncombatant targets by subnational groups or clandestine agents, usually intended to influence an audience<sup>5</sup>." In White (2003, p.12) we find the following definition according to the US Department of Defense: "Terrorism is the unlawful use or threatened use of force or violence against individuals or property to coerce or intimidate governments or societies, often to achieve political, religious, or ideological objectives". According to Enders and Sandler (2006), all modern definitions include the presence or threat of violence and a political or social

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<sup>4</sup>Another work in support of the rationality assumption of suicide attacks has been done by Pape (2003).

<sup>5</sup>The US Government has employed this definition of terrorism for statistical and analytical purposes since 1983. - Title 22 of the United States Code, Section 2656f(d).

motive. Enders and Sandler argue that the most widely accepted definitions include *the victim*, *the perpetrator* and *the audience*. The victim is the party which is directly threatened by the terrorist attack. The perpetrator is the party which conducts the attack and the audience is the society which is threatened indirectly through inducing fear and scare to a mass of people. Scientists also differentiate between *domestic terrorism* and *transnational terrorism*. Domestic terrorism is that form of terrorism that involves only one country (Riley and Hoffman, 1995). Transnational terrorism involves two or more countries (Tsang, 2009). Palestinian terrorism in Israel for instance can be considered domestic terrorism. The international war on terrorism against al-Qaeda is a form of transnational terrorism. According to Nacos (2002), media coverage is among the terrorist group's main goal for their assaults.

### **Counter-Terrorism**

Counter-terrorism consists of all government actions which try to prevent terrorist attacks or curtail their consequences (Enders and Sandler, 2006). According to Ganor (2005), the three main goals of a government countering terrorism are to eliminate terrorism, to minimize damage caused by terrorism and to prevent the escalation of terrorism. Ganor says that eliminating terrorism means removing the enemy's incentive to commit terrorist attacks and use violence against the state and its citizens. Minimizing damage may include subgoals like reducing the number of attacks of the number of victims through reducing certain types of attacks (e.g. suicide killings). Preventing the escalation of terrorism includes stopping the terrorist organization's growth and development, preventing the organization from gaining political achievements and blocking support from foreign countries.

### **Effectiveness**

Since the topic of this paper is the effectiveness of counter-terrorism strategies, we have to be clear on what effectiveness means in this context. Although no exact definition of "effectiveness" has been provided in the literature, there are implicit definitions, such as in Enders and Sandler (1993) who say that specific policies may have unintended consequences and may therefore not be effective and policies that verifiably reduce the number of

attacks or the number of people killed in a specific form of attack can be classified as effective. They ask "How effective are metal detectors at airports? Do these metal detectors have unintended consequences on other types of terror attacks?" (Enders and Sandler, 1993, p.1) They do not understand the definition of "effectiveness" as an absolute determined state but rather as the attribute of a specific counter-policy to be able to reduce a specific form of terror attacks. Perl (2005) stresses the importance of cost-effectiveness. So using a minimal amount of resources to maximally reduce the number of a specific type of terror attacks and the number of fatalities. Whenever there is a method to further decrease the number of attacks and the number of people killed or injured with the same resources, from a government point of view, this measure would be more effective. According to Perl, *incidents, attitudes* and *trends* are the key variables for assessing how well the process of terrorism is disrupted. According to Frey and Luechinger (2002), strategies are effective if they dissuade terrorists from attacking. They argue that an effective way to counter terrorism is to raise *opportunity costs* rather than to raise the material costs to terrorists. "When good outside offers are available to the members, the leaders tend to lose control. The terrorist organization's effectiveness is thereby reduced" (Frey and Luechinger, 2002, p. 17). Zussman and Zussman (2006) say that the opposite of "effective" in the context of counter-terrorism measures is "counterproductive". Zussman and Zussman also focus on a comparison of the number of terror attacks and fatalities before and after the implementation of a certain policy, so their view of "effectiveness" is in line with the implicit understanding of Enders and Sandler. Sandler and Lapan (1988) say that "[...] nor does it change the perceived marginal effectiveness of deterrence expenditures in reducing the probability of an attack somewhere" (Sandler and Lapan (1988), p. 256). According to the implicit definitions from the literature we can derive the following definition which will be used in this paper: An effective counter-terrorism measure is that policy where the number of successfully reduced terror attacks and fatalities in combination with a certain resource input by the government is higher than for another strategy and is therefore more effective. When the effectiveness is maximal, the potential of reducing the number of attacks and fatalities is maximal and the resources needed is minimal. When two strategies reduce the number of attacks by the same amount, the strategy that needs less

resources is the more effective one. Similarly, when two strategies imply the same costs to the government, the more effective strategy reduces the number of terror attacks by a larger amount.

## 2.3 Defining the Game

In order to discuss the effectiveness of counter-terrorism policies, we have to introduce the game setting.

### Governments

Enders and Sandler (2006) say that democratically elected governments have to protect their citizens from terrorist attacks. If a government seems weak to the public, it can be elected out of office quite quickly. Therefore, when defining the game, costs and benefits of the government are: Any successful terrorist attack on a country's citizens denote serious costs to the country's government. When people are killed in a terror attack, the government will be held responsible since it is the only authority that can provide serious counter-measures (Frey and Luechinger, 2002). Governments have strong incentives to counter any terrorist attacks. In a rational calculus model, a government has to give in to the terrorists' demands if the costs of an attack exceed the costs of conceding (Enders and Sandler, 2006). Pape argues that there is strong evidence that governments can indeed be displayed as rational optimizers, for example when Israel partially backtracked from the West Bank after the Hamas suicide campaign against Israel from October 1994 - August 1995<sup>6</sup>, because the Israeli government must have included its cost into its maximization problem and those costs must have surpassed the benefits of staying in the West Bank. So governments have certain costs and benefits, but also a feasibility constraint.

The different possible measures which can be taken by a certain government can be divided into two groups: *Proactive* and *defensive* measures (Rosendorff and Sandler, 2004). Rosendorff and Sandler say that proactive measures are those actions which attack terrorists directly, that is, terrorist leaders, their assets and resources or other supportive parties. Defensive measures whereas are those actions which do not attack terrorists directly

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<sup>6</sup>Pape, 2003, Table1.

but form a kind of protective barrier around a potential target, thus decreasing the likelihood of success or increasing the terrorists' costs of the respective attack. Proactive actions are for example arresting terrorists' leaders, freezing their financial assets or destroying their weaponry supply (Enders and Sandler, 2006). An example for a defensive measure was the introduction of metal detectors at US airports in the 1970s or the building of the Israeli West Bank barrier to prevent Palestinian suicide bombings.

### 2.3.1 Proactive Responses

According to Sandler and Arce (2007), proactive responses are those which offensively attack terrorists' human and non-human resources, such as training camps, ammunition depots, financial assets and other sorts of sponsorship or infrastructure. That way, the counter-terrorism unit is actively involved in restraining the terrorists' resources (Sandler and Siquiera, 2009).

According to Enders and Sandler (2006), terrorist groups face the same maximization problem as every household, that is, maximizing their utility subject to a monetary or non-monetary resource limitation. The terrorists maximization problem in this framework is:

$$\max U(T, N)$$

s.t.

$$P_T T + P_N N = I.$$

where  $P_T$  and  $P_N$  are the prices for terrorist and non-terrorist activities respectively. We denote the terrorists' total resources as  $I$ .  $U$  is the utility function,  $T$  and  $N$  are the amount of terrorist and non-terrorist activities respectively. Therefore, the priced values of the chosen level of terrorist and non-terrorist activities have to equal the terrorists' total endowment. In this framework, Enders and Sandler assume a negative slope for the terrorists' budget constraint. Also, the groups different indifferent curves are displayed in Figure 1. Indifference curves are those levels where the total utility is the same. Consequently, the terrorist group wants to achieve the highest possible indifference curve when they act as rational agents (Arce

and Sandler, 2005). In the framework presented by Arce and Sandler, the optimal set has to be feasible. The group can only reach an indifference curve which is feasible according to the budget limitation. Indifference curves would be linear if the inputs were perfect substitutes. However, in this model, they assume diminishing returns on the substitution of one type of input and thus concave indifference curves. According to Enders and Sandler (2006), the optimal allocation can be displayed the following way:

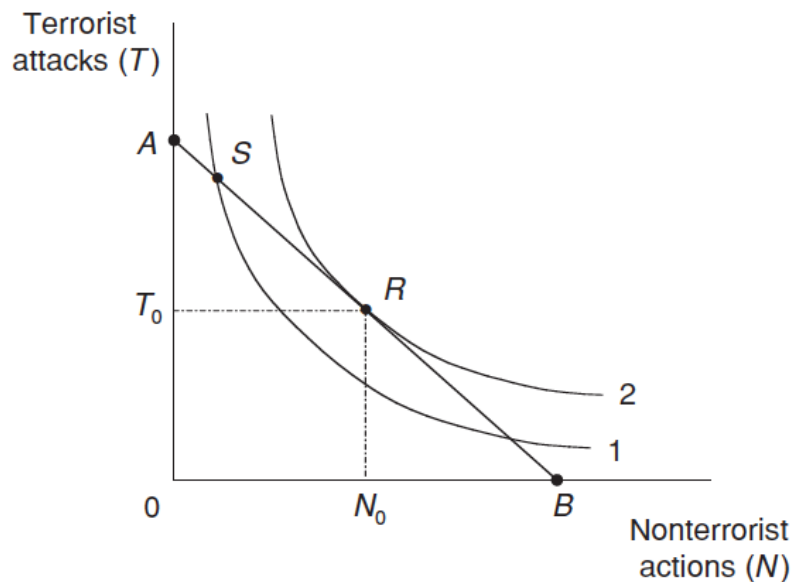


Figure 1: The optimal allocation (Enders and Sandler, 2006).

Enders and Sandler assume normal goods in this framework (2006). So whenever a certain terrorist group has more resources, the number of terror attacks will increase. A negative income effect will therefore decrease the total amount of both goods. This paper will also follow Enders and Sandler's argumentation, although there might also be reasons to assume inferior goods for specific situations, for example when terrorist groups work more effectively when their budget is more limited.

Consider the budget constraint as AB. Rational optimizers will select the highest indifference curve as their optimal allocation. In Figure 1, the feasible optimum will be R.

Enders and Sandler argue that, in this framework, a group faces the decision to engage in terrorist or non-terrorist actions when their political goals can also be reached through a non-violent type of actions.

While this has been the case in Israel, Enders and Sandler also consider other types of organizations, when the framework will involve only the decision of what type of terrorist action should be carried out. This is the case when a group is too specialized in terrorism, such as for example al-Qaeda. The framework and the maximization problem will be slightly different, like shown in Figure 2.

$$\max U(\text{Type1}, \text{Type2})$$

s.t.

$$P_{\text{type1}}\text{Type1} + P_{\text{type2}}\text{Type2} = I.$$

Sandler and Siquiera (2009) also consider the time aspect of a game-theoretical analysis, since terrorists can enlarge their total resources over time, they will also consider the best time for action to maximize the attack's impact.

Enders and Sandler (2006) assume a rational-choice model for the terrorists. They argue that, applying game theoretical models yields straightforward implications for how terrorists will respond to future events. This insight is crucial to the evaluation of counter-terrorism measures from a political economy perspective.

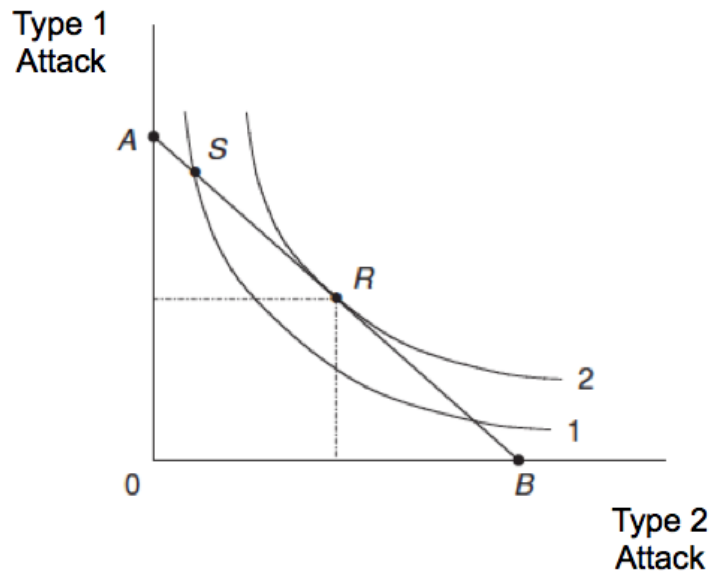


Figure 2: Type1 and Type2 terror attacks (modified from Enders and Sandler, 2006).

### Terrorists

Terrorists experience certain costs and benefits of their activities (Trager and Zagorcheva, 2005). According to Trager and Zagorcheva, costs can be anything from monetary costs of building bombs, operate terror camps or recruiting combatants to the costs of losing fighters in suicide missions or when key leaders of the group are arrested (Enders and Sandler, 2006)<sup>7</sup>. In this framework, benefits of attacks have to outweigh their costs. Benefits can be anything from the withdrawal of soldiers of a foreign occupation, the release of fellow combatants from prison, media coverage of the terrorists' ideas to the general intimidation of the public (Trager and Zagorcheva, 2005).

It can be difficult to clearly identify costs and benefits for the terrorist groups. Often, it is not exactly apparent what the exact goals of those groups are, such as for example al-Qaeda's war on non-believers. Many authors have

<sup>7</sup>Note that the cost of an attack must not always correlate with its effectiveness, for example when terrorists make fake calls to announce an attack, this can create substantial public fear, but the costs for this operation is low (Enders and Sandler, 2006).

distinguished this fact as a weakness of the political economy approach. Enders and Sandler (2006) argue that although the exact categorization seems difficult, it seems plausible that there are costs and benefits associated to their activities and that there is a certain budget limitation. They say that terrorists have a certain set of preferences and they are able to rank and order the different feasible choices and they will always select the most preferred available choice. Rational terrorists with a political goal allocate their resources to either terrorist or non-terrorist actions subject to their budget constraint. According to Enders and Sandler, substitution of different attack modes is most likely for activities that require a similar set of resources and logistics. Complements are those types of attacks that reinforce each other's effectiveness (Enders and Sandler, 1993). One could think of bombings and threats as such a complement.

Terrorists try to receive the highest possible indifference curve subject to a certain feasibility condition (Frey and Luechinger, 2002). When proactive measures reduce the terrorists' overall resources, the slope of their resource constraint does not change at all, instead, there will be a parallel shift of the budget constraint, like presented in Figure 3.

Since the budget constraint has shifted parallelly, the new optimal allocation is  $R''$ . Because we have assumed concave indifference curves, the group will choose an allocation which reduces both terrorist as well as non-terrorist activities.

Consider the framework from Figure 2 where terrorists chose between two types of terror attacks.

When the resource constraint shifts parallelly, they reduce both types of terror attacks. This is why an effective counter-terrorism measure will always affect the terrorists' resources as a whole (Enders and Sandler, 2006). Resource-effective like suggested by Perl (2005), but also the effectiveness in Enders' and Sandler's understanding will be a policy that does not induce transference from one type of attack to another but will reduce *all* type of attacks at the same time (Enders and Sandler, 2006). It follows that only a policy which affects the terrorists' overall budget can be effective in that

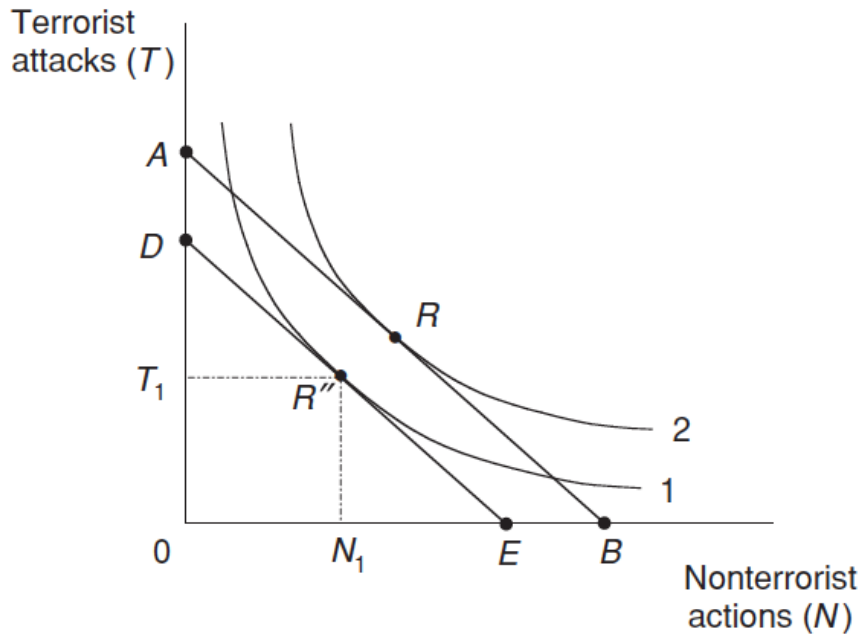


Figure 3: Reduction in terrorists' resources (Enders and Sandler, 2006).

sense. Otherwise, in the case where only the costs of a specific type of attack is raised, transference will occur (Landes, 1978) and the policy will not be as effective as a policy which would reduce the appearance of all types of attacks.

However, proactive responses might also increase the price of terrorist activities only. That way, the slope of the terrorists' budget constraint will shift from AB to CB in Figure 4. This will also change the terrorists' optimal allocation.

The difference to the framework from Figure 2 is that activities are not reduced by the same amount here. The new optimal allocation is  $R'$ , terrorist attacks have been reduced more than in the previous framework, but nonterrorist activities have actually increased. This framework represents situations where terrorist groups have certain political goals that could - at least in theory - also be achieved through a political process. In this framework, governments can facilitate access to non-terrorist activities such as elections or democratic representation of the group. A preemptive opera-

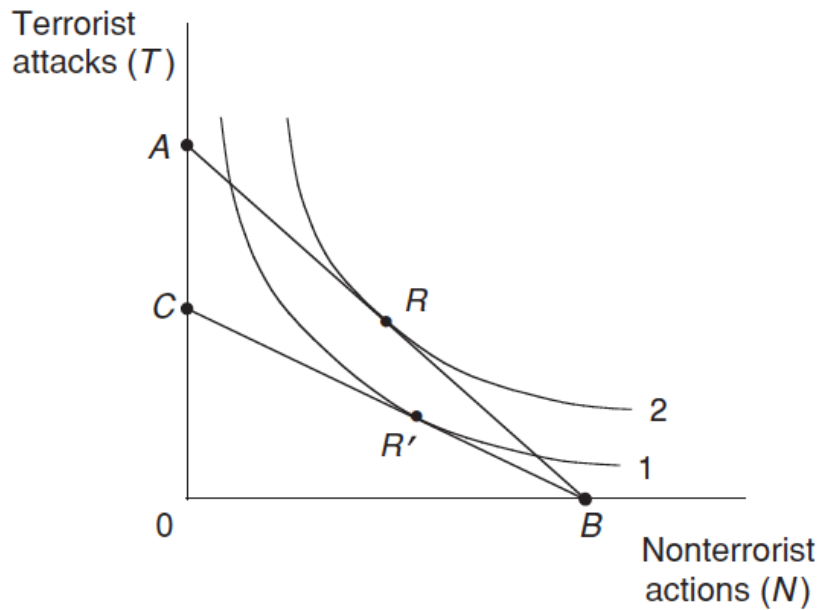


Figure 4: Increasing the costs of terrorist attacks (Enders and Sandler, 2006).

tion which limits the capabilities of terrorist group grants non-excludable and non-rival benefits to all potential targets (Enders and Sandler, 2006).

It is also important to bear in mind short- and long-run effects of the modification of the terrorists' budget constraint and the following adjustment of their optimal allocation.

The insight that the transference phenomenon has to be avoided has also important implications for the so called *weakest link problem* which will be discussed in 2.3.5 Evaluation.

### 2.3.2 Defensive Responses

Defensive responses are those government actions that make terrorist attacks more costly for the terrorist group or decrease their likelihood of success. Defensive actions are for example the fortification of embassies abroad, the installation of metal detectors at airports or the threatening with long-time imprisonment for terrorism activities or their supportive actions (Enders and Sandler, 2006).

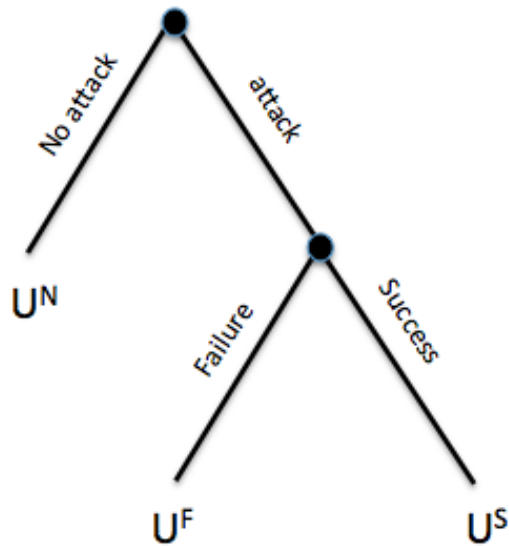


Figure 5: Decision tree and expected utility.

Consider the decision tree from Figure 5. A successful attack yields a higher utility than an unsuccessful attack, therefore  $U^S > U^F$ .

Assuming that  $\pi$  is the probability of a successful outcome of a type 1 terror attack, then  $(1-\pi)$  is the counter-probability. Then, type 1 terror attack will be undertaken if:<sup>8</sup>

$$U^N < EU^{\text{type 1}} = \pi U^S + (1-\pi)U^F$$

An effective defensive counter-terrorism measure will always reduce the expected utility  $EU^{\text{type 1}}$  (Enders and Sandler, 2006).

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<sup>8</sup>This is based on the assumption that terrorists are risk-neutral (Enders and Sandler, 2006).

### 2.3.3 Cooperation Component of Proactive and Defensive Responses

International cooperation is significant for the effectiveness of proactive as well as for defensive counter-terrorism policies and one of the key implications of the political economy approach for the effectiveness of counter-terrorism measures on the international level. Many strategies can only be effective when governments coordinate their actions (Arce and Sandler, 2005). Even when we analyze domestic terrorism, the distinction between domestic and transnational terrorism is not always so clear (Enders and Sandler, 2006). When we consider Palestinian terrorism in Israel for example, there are many countries which support the Palestinian cause, be that with the supply of physical assets like weapons or financial support. In fact, this issue would make the Palestine-Israel conflict transnational. In economics, counter-measures against terrorism are seen as a public good which yields nonrival benefits. That is, the *free-rider problem* is closely connected to the need of international cooperation. On the national level, the free-rider problem is the reason why all counter-terrorism tasks are assigned to the government and financed by taxes (Lee and Sandler, 1989). But on the international level, there is no supranational authority which could provide counter-terrorism activities financed by taxes from possible target countries (Enders and Sandler, 2006).

#### Effectiveness

##### a) Cooperation in Proactive Responses

From a game-theoretical analysis, we can identify several different frameworks that represent situations where governments have to take proactive responses. Among the most important frameworks which depict situations of international counter-terrorism strategies are the *Prisoners' Dilemma*, the *chicken game*, the *multiple nation preemption game* and the *coordination game* (Enders and Sandler, 2006 and Arce and Sandler, 2005). The Prisoners' Dilemma can also represent a framework for defensive responses.

In a non-cooperative framework the interaction of governments can be displayed in a simple game theoretical approach and the need for international cooperation becomes evident. In order to analyze the effectiveness of

counter-terrorism measures from a government point of view, the following has to be true: All governments decide independently on their counter-terrorism measures, the rules of the game, the set of players, their available strategies and the payoffs of all available strategies are clearly defined (Enders and Sandler, 2006).

### **The Chicken Game**

According to Anderton and Carter (2004), a game-theoretical framework that represents typical situation within the international cooperation problem is the *chicken game*, which is a game with no *dominant strategy*, but two *Nash equilibriums* as displayed in Figure 6. A dominant strategy is that strategy, which will always be preferred given the strategy of the other players. The Nash equilibrium is that state, where no player has incentives to unilaterally change his strategy. The largest payoff comes from not participating in any counter-measure while the other party does. The second-best payoff occurs when both parties participate. But the failure to coordinate a proper response can be disastrous for the *chicken*, since the smallest payoff will occur when no party participates at all.<sup>9</sup> Typically, a situation where no government would take action against a specific terrorist threat can be characterized as a chicken game. Anderton and Carter (2004) argue that this set-up is particularly important for the assessment of the effectiveness of counter-terrorism policies because there are many situations where governments try to free-ride. An effective cooperation on the international level is increasingly difficult because governments interests diverge as displayed in the chicken game.

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<sup>9</sup>This game has become popular through James Dean's movie *Rebel without a Cause*.

		B	
		not participate	participate
A	not participate	1,1	<b>4,2</b>
	participate	<b>2,4</b>	3,3

Figure 6: The chicken game in ordinal form (Enders and Sandler, 2006).

#### b) Cooperation in Defensive Responses

A main issue for defensive responses is the phenomenon of transference (Landes, 1978). Landes found that when the United States introduced metal detectors at US airports for the first time, the average number of hijackings in the US indeed decreased, but other forms of terrorism actually increased, such as the kidnapping of diplomats or the attack on US citizens abroad. This observation suggests that terrorists indeed optimize according to a certain budget limitation, thus, if the likelihood of success of US aircraft hijacking decreases, they shift their activities to other forms which are now relatively more lucrative. Enders and Sandler (2006) argue that the phenomenon of transference is also one of the main reasons why for an effective counter-terrorism policy, international cooperation is crucial.

#### **The Prisoners' Dilemma, the Multiple Nation Preemption Game and the Coordination Game**

For defensive responses, the *Prisoners' Dilemma* is a game-theoretical framework normally associated with defensive responses (Arce and Sandler, 2005), that describes the situation when international cooperation would increase the benefits of both parties, but instead governments choose their dominant strategy which leads to a Nash equilibrium that does not maximize the total welfare like in Figure 7.

		B	
		confess	not confess
A	confess	<b>2 years, 2 years</b>	0 years, 4 years
	not confess	4 years, 0 years	1 year, 1 year

Figure 7: Prisoners' Dilemma in jail sentence terms (Enders and Sandler, 2006).

The Prisoners' Dilemma represents a situation where two convicts can either confess or not confess, while with cooperation, both convicts can choose not to confess and go to prison for one year each. But, for either convict, it is better to not cooperate and confess, so in the Prisoners' Dilemma the dominant strategy for each player is to confess. This yields a Nash Equilibrium (confess, confess) with payoffs (2 years, 2 years). Mutual cooperation could have improved the prisoners' situation (Lee, 1988). According to Lee, the Prisoners' Dilemma depicts the situation when the *free rider* problem exists for defensive responses, that is, when a country can benefit from international cooperated anti-terror measures without participating in their financing. That way, either government would want to withhold its own contribution and wait for the others to invest and so to benefit from the engagement of the others. But when every government acts that way, none will ever invest, which yields the Nash equilibrium with no cooperation (which is to confess in the classical depiction of the Prisoners' Dilemma), although, with international cooperation, the benefits of each player would be higher.

According to Lee (1988), the so called free-rider problem is among of the main insights of the game-theoretical analysis and it becomes even more evident in the *multiple nation preemption game*, when not two countries have to decide on their actions, but when more than two parties are involved

(Enders and Sandler, 2006). This game is important for the assessment of the effectiveness of counter-terrorism policies because in most of the cases, counter-terrorism will most likely affect more than just one country.

	Numer of preempting nations other than $i$					
	0	1	2	3	4	5
Nation $i$ does not preempt	0	4	8	12	16	20
Nation $i$ preempts	-2	2	6	10	14	18

Figure 8: Six-nation preemption game (Enders and Sandler, 2006).

The bottom row of Figure 8 represents nation  $i$ 's payoff when it preempts, according to the number of countries other than  $i$  which also preempt. The top row represents the action when nation  $i$  is not preempting at all. As the top-row payoff always exceeds the payoffs from the lower row, not preempting is nation  $i$ 's dominant strategy. This yields a Nash equilibrium where no country is preempting. Technically speaking, this is a Prisoners' Dilemma with more than two players (Enders and Sandler, 2006). According to Lee (1988), this outcome does not optimize the total welfare. If all nations were preempting, the total payoff would be 108. This means that by executing their dominant strategy, the society loses a payoff of 18 each round in this scenario. Again, this example illustrates the need of international cooperation for counter-terrorism strategies to be effective.

In addition to that, it shows the difference between a country's reaction to domestic and transnational terrorism, because for domestic terrorism, the free-rider problem does not exist since the country will rely on its own counter-measures alone (Lee, 1988).

### The Coordination Game

Closely linked to the multi-nation preemption game is the so called *coordination*

*dination game*. This is a framework where the non-participation of a single country can undo the efforts of all others. This is a game where both governments have to take identical measures to maximize their payoffs (Enders and Sandler, 2007). The nation which takes measures alone will receive the smallest payoff.

		Nation 2	
		Freeze	Status quo
Nation 1	Freeze	<b>F,F</b>	B,E
	Status quo	E,B	<b>A,A</b>

Figure 9: Freezing assets: coordination game (Enders and Sandler, 2006).

A good example is the situation when countries try to freeze financial assets of terrorist groups. Enders and Sandler (2007) assume only two players, which have to decide on freezing terrorists' assets or remain with the status quo. As described above, a single country could undo the whole effort of the other countries by not participating. This framework also shows that a country could benefit from not participating. However, if discovered, that country might risk negative ramifications. This game has two Nash equilibriums in pure form: (freeze, freeze), (status quo, status quo). These are Nash equilibriums in pure strategies, so a nation will exercise its strategy throughout all periods. According to Enders and Sandler (2007), there is also a Nash equilibrium in *mixed strategies*. Mixed strategies are strategies that are played with a certain probability. Denote  $\pi$  as the probability for a government to freeze the assets, then the counter-probability is  $(1 - \pi)$ . An equilibrium in mixed strategies is derived by finding the value  $\pi$  for the one country that leaves the other country indifferent between the two possible actions:

$$\pi F + (1 - \pi)B = \pi E + (1 - \pi)A$$

So government 1's expected gain from freezing assets, based on government 2's uncertain action, equals government 1's expected gain from not participating.

The equilibrium is:  $\pi = (A - B)/(F - B - E + A)$ .

So the strategy that will be executed by either one of the players depends on the expected value of the opponents value of  $\pi$ , which is the so called *adherence probability* (Sandler, 2005). For example, if one government thinks that there is a higher probability that its opponent will freeze the assets, it will follow this action. The required probability  $\pi$  can be reduced by increasing the benefit for both players for mutual actions (Enders and Sandler, 2007). However, if there are more incentives to provide a safe haven for terrorists, this will increase the required probability  $\pi$  for cooperation. Sandler and Sargent (1995) found that if we allow for multiple nations, a near certain probability  $\pi$  is required for cooperation. They say that "if each individual's effort is independent and identically distributed with a common cumulative distribution function (cdf) equal to  $F(x_j)$ , then the cdf for the minimum is:

$$F_{\min}(x) = 1 - [1 - F(x_j)]^n.$$

Therefore even a small probability that the minimum might not be met will drive  $F_{\min}$  to 1 and make cooperation unlikely." (Sandler and Sargent, 1995, p. 151)

### **Externalities**

Enders and Sandler (2006) argue that an important explanation for the lack of international cooperation are *transnational externalities*. Transnational interdependencies often lead to unilateral actions, such as the US invasion in Iraq (Sandler, 2003). Generally speaking, an externality is an uncompensated interdependency between two or more agents (Sandler and Enders, 2002). If the action of one country creates costs or benefits to another country, then transnational externalities exist. For example, after the institution

of better anti-terrorism policies of the US and the EU, there were many attacks in third-world countries like the Philippines or Malaysia. This is a case of a negative transnational externality (Enders and Sandler, 2006).

Other policies may imply *transnational external benefits* (Enders and Sandler, 2006). This can be the case when unilateral actions by one country lowers the risk of attacks for other countries, without any remuneration for the proactive country's effort. One example can be the US effort of arresting al-Qaeda's leaders, since this may have lowered al-Qaeda's threatening power to other Western countries (Sandler and Enders, 2002). When evaluating counter-terrorism measures on the international level, both positive and negative externalities have to be considered. There might also be cases where both external costs and benefits arise (Rosendorff and Sandler, 2004).

#### **2.3.4 The Weakest Link Problem**

The weakest link problem is a phenomenon that emerges directly from the theory discussed for international cooperations (Arce and Sandler, 2005). According to Arce and Sandler, the weakest link problem describes the issue that certain defensive measures have to have a global standard, otherwise terrorists will search for the weakest link and strike on that softer target once identified as such.

The weakest link problem exists in airport security, as level of security might be high in the US or the EU, but other airports for example in developing countries are less endowed with high-tech counter-terrorism techniques. Thus, terrorists may shift away from secure airports to relatively softer targets. The global level of security will depend on the smallest provision level (Hirshleifer, 1983). Consider the matrix from Figure 10 to depict this game.

Strategies in this game are either to update the security level of the airports or remaining with the original standard (Enders and Sandler, 2006). Suppose that upgrading costs 6 but when both players chose to update their security level, benefits for each country will be 8. However, if only one country choses to update its security level, benefits will be 0. This is a game

		EU	
		Status quo	Security upgrade
US	Status quo	<b>0, 0</b>	0, -6
	Security upg	-6, 0	<b>2, 2</b>

Figure 10: Increasing Security Standards at International Airports (Enders and Sandler, 2006).

with no dominant strategy but with two Nash equilibriums (not updating, not updating) and (updating, updating). The total welfare is maximized through the Nash equilibrium (updating, updating). A key attribute of the *weakest-link public good* is that mutual actions are required to maximize the total welfare and unilateral actions will induce only costs but no increase in benefit.<sup>10</sup> This game illustrates that when governments do not cooperate, weakest links will always be present (Sandler, 2003).

Out of the theory presented in this section, Enders and Sandler (1993, p. 831) have derived four main propositions.

*Proposition 1: Relative Price Effects.* "An increase in the relative price of one type of terrorist activity will cause the terrorist group to substitute out of the relatively expensive activity and into terrorist and non-terrorist activities that are now relatively less expensive."

*Proposition 2: Substitutes and Complements.* "Terrorists attack modes that are logistically similar and yield similar basic commodities will display the greatest substitution possibilities. Since the effects of complementary

<sup>10</sup>This is also the reason why one of the four pillars of US counter-terrorism policy is to "bolster the counter-terrorist capabilities of those countries that work with the United States and require assistance" (US Department of State, 2003, p. xi), for an in-kind transfer analysis from wealthier countries to poorer countries, see Vicary (1990) and Vicary and Sandler (2002).

events are mutually reinforcing, an increase (decrease) in the price of one activity will cause that activity and all complements to fall (rise) in number.”

*Proposition 3: Terrorist-Nonterrorist Substitutions.* “An increase in the price of all terrorist activities or a decrease in the price of nonterrorist activities will decrease the overall level of terrorism.”

*Proposition 4: Income Effect.* “For normal goods, an increase (decrease) in the resource base will cause a terrorist group to increase (decrease) the level of terrorist and nonterrorist activities.”

### **2.3.5 Evaluation**

We have seen that the success of a counter-terrorism policy depends on its ability to limit terrorists’ choice set and therefore they need to have an effect on terrorists’ total resources. The costs for *all* different forms of attacks have to rise. We cannot determine by game-theoretical models if a government should always prefer proactive or defensive measures. To determine the optimal mixture would require a careful empirical investigation (Enders and Sandler, 2006). On the international level, cooperation is of crucial importance to the effectiveness of counter-terrorism policies.

## **3 The Israel Example**

The purpose of this section is to give real world examples of the application of the theory presented in section one.

The Israel Example has been selected here because it is an example for domestic terrorism with international traits, against a democratic country that dates back many decades, which makes it useful for study purposes. Besides that, in contrast to transnational terrorism faced by Europe and the United States, the goals of the Palestinian terrorists are much clearer than those of al-Qaeda and other groups, which makes a political economic analysis even more applicable (Levitt, 2002). Israeli counter-terrorism measures

have been studied by many scholars and institutes such as the RAND National Defense Research Project, the Israeli National Security Council or the ITERATE Project of Duke University. More insight into the effectiveness of counter-terrorism is of crucial importance to a government like that of Israel and the Israel Defense Forces (IDF), which must face the threat of terror attacks on a daily basis.

The Israeli democracy has faced terrorist violence like hardly any other government throughout its history.

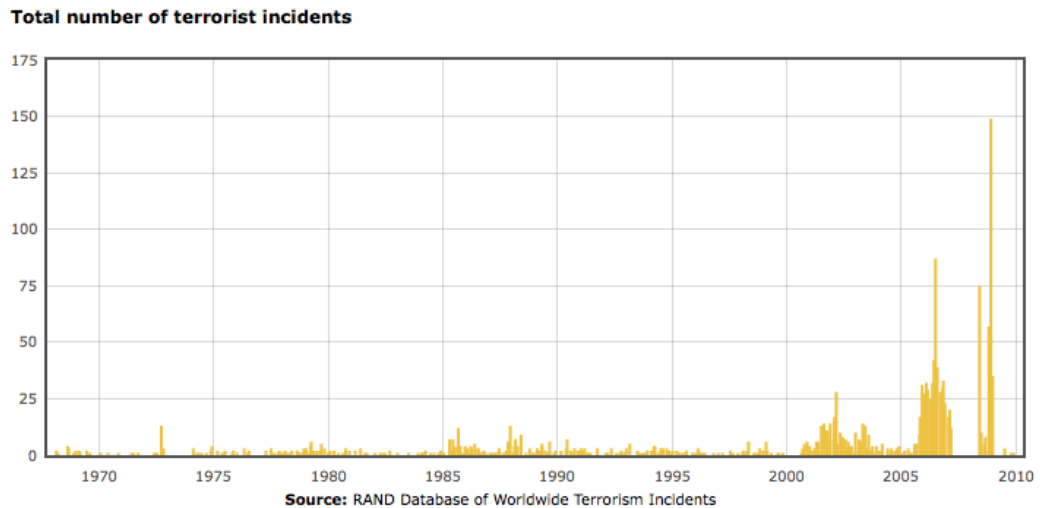


Figure 11: Total Number of Terror Attacks on Israel Since 1948 (RAND, 2011).

The RAND Database lists 1687 incidents since the year 1968<sup>11</sup>. It also lists 107 suicide attacks, most of them committed either by Hamas or the Islamic Jihad:

According to RAND, 54 terror attacks on Israeli territory with 5 or more

<sup>11</sup>In 1972, shortly after the terrorist attacks at the Munich Olympics and the Red Army attack on Lod Airport in Israel, the U.S. government formed the first official government body charged with fighting terrorism, the Cabinet Committee to Combat Terrorism. This Committee asked RAND to examine recent trends in terrorism, prompting a team of RAND analysts to begin development of a database, the first of its kind, known initially as the RAND Terrorism Chronology.

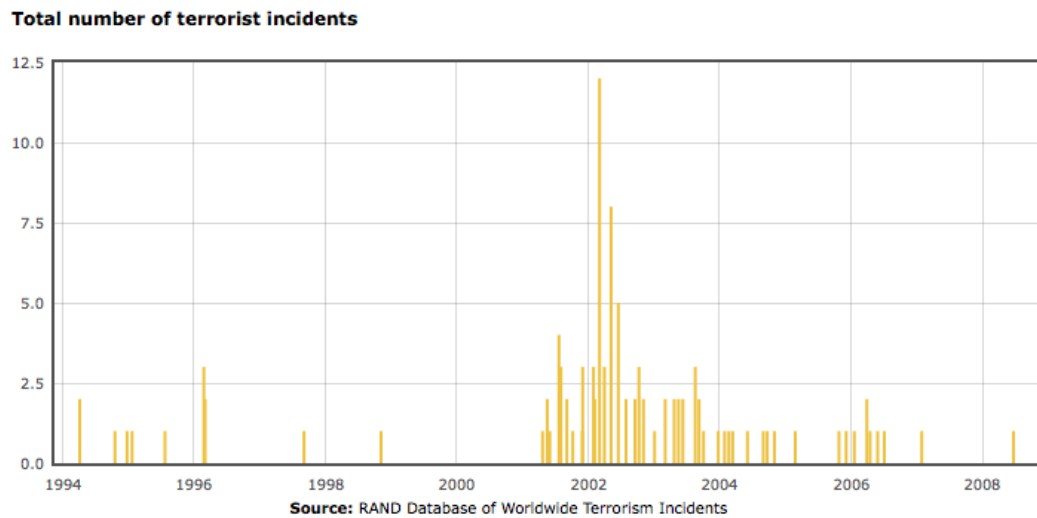


Figure 12: Suicide Incidents on Israeli Territory (RAND, 2011).

fatalities from 1994-2011 have occurred, among these 46 were suicide bombings<sup>12</sup>. This incident makes it evident why the study of the effectiveness of counter-terrorism measures should be a crucial task for Israeli policy-makers. As a first step, we will have a closer look at current and past strategies of counter-terrorism in the state of Israel. After that, the practical examples shall be matched with the theory presented in section one. That way, we will be able to draw conclusions with respect to the effectiveness of those counter-measures from the political economy perspective.

### 3.1 History of Strategies

To see how we can assess the effectiveness of counter-terrorism strategies from the political economy perspective, using the Israel Example, we have to provide a brief overview of the current and past strategies that have been applied by the Israeli government until today.

#### A Brief Historic Overview

The Israeli-Palestinian dispute is an asymmetric conflict between the State of Israel and the Palestinian liberation movement, fighting for the former British mandated territory of Palestine (Tucker, 2003). According to Alon

<sup>12</sup>Own data research.

(1980), since 1967, aggressions of Palestine groups are mainly targeted against the occupying forces of Gaza and the West Bank. After the formation of the State of Israel and the first Arab-Israeli war, infiltration of Palestinian activists began, leading to the formation of nationalist groups supporting the Palestine liberation movement from the 1950s onwards. In the 1960s, the Palestine Liberation Organization (PLO) emerged, leading a guerrilla war against Israel, which gained intensity after the Six-Day-war. Groups like "Black September" were involved in hijackings, hostage-takings and other terrorist activities. Continuing violence then led to the Israeli invasion in Lebanon. A second terrorist group emerged: The Hezbollah.

The first Intifada from 1987 until 1993 led to secret negotiation of the Israeli government and the PLO (Alexander, 2002). According to Alexander, that peace movement, however, was accompanied by continuing terrorist violence against Israel. Finally, another big wave of suicide attacks committed by Hamas and the Islamic Jihad was initiated when the Jewish doctor Baruch Goldstein shot 29 Palestine Muslims during their prayer on February 25, 1994. This incident is referred to as the *Cave of the Patriarchs Massacre* (Paine, 1995). Hamas' terror attacks declined after international isolation and ongoing imprisonments after 1998. Violence then escalated again after the breakout of the Second Intifada in September 2000, when the construction of the Israeli settlements continued and the Israeli government failed to implement the agreements of the Oslo Peace Accords (Moghadam, 2003).

### **Paradigms**

According to Baumgart-Ochse (2008), Israel's counter-strategies are dominated by the so called *war-paradigm*. That is, the conflict is generally categorized as a war, in contrast to the *criminal prosecution-paradigm* and the *political-paradigm*.

The criminal prosecution-paradigm sees counter-terrorism as a task for the police, justice and secret services of a country in compliance with the rule of law. The main counter-actions within the political paradigm is fighting terrorism at its roots by developing political and economic strategies. The war-paradigm, however, makes a country's army the main actor for

counter-terrorism measures. The state of emergency is declared since the formation of the State of Israel in 1948, which - in combination with the so called Defense Emergency Regulation enacted by the British Mandate Power in 1945 - equips the Israel Defense Forces with a certain freedom of action (Mersel, 2005). The main difference between the criminal prosecution-paradigm and the war-paradigm is that within the war-paradigm, the risk of violating international law is high, because in war time, civil legal order is normally suspended. Only the Israeli supreme court has rejected certain types of counter-measures so far, complaining that certain measures are not in line with international law (Baumgart-Ochse, 2008), for instance in cases of *targeted killing* and *targeted house destruction*. Baumgart-Ochse argues that the problem with the war-paradigm is that it causes increasing support of counter-violence on the Palestine side. Criminal prosecution has not played a big part in Israeli counter-terrorism strategies so far. Political integration of the PLO in the peace process lead to a decrease in violent activities. An important finding is that violent groups can shift their activities when they can reach their goals with non-violent actions (Enders and Sandler, 2006).

### **Proactive and Defensive Actions**

Israel has applied proactive as well as defensive measures. Historically, proactive measures have included offensive military actions against the PLO in Jordan, Lebanon and the occupied territories (Baumgart-Ochse, 2008). To defend its borders, the Israeli government initiated a safety barrier from the Sea of Galilee to the Dead Sea, with monitoring cameras and sensors (Kober, 2006). The war-paradigm has been present throughout the entire Israeli history for historic reasons. According to Bright (2002), Israel felt surrounded by hostile states since its formation, whose ultimate goal is the destruction of the State of Israel. After secret negotiations between the Israeli government and the PLO, however, a peace process was initiated (Lukacs, 1999). According to Baumgart-Oechse (2008), this was the only time when the war-paradigm was outweighed by the political paradigm. After the Second Intifada, Israel returned to the war-paradigm, attacking infrastructure of the Palestinian National Authority, besieging and occupying the autonomous cities, arresting suspects and destroying houses of terror suspects.

Among Israel's strategies for prevention and criminal prosecution has been the establishment of HUMINT (Human Intelligence), which is a network of Palestinian informants, supervised by the Israeli domestic intelligence service *Shin Bet* and its foreign intelligence service, the *Mossad* (Gazit, 2003). They have also been involved in gathering information about locations, infrastructure, strategies and actors of suspect terrorist organizations abroad (Kirchheimer, 2010). However, as mentioned above, criminal prosecution has not been among Israel's main counter-strategies so far.

Another key strategy is to raise the awareness of the Israeli public. Nonetheless, the far majority of Israel's counter-strategies have been military ones (Baumgart-Ochse, 2008). According to Gazit (2003), the intention of military interventions have not only been retaliation, but also the determination and the demonstration of the supremacy of the Israeli Defense Forces. IDF have used warplanes, high performance radars, recce drones and special trained forces for missions in hostile regions. The so called "Defensive Emergency Regulations" include closures of Palestinian cities and villages on certain Israeli or Palestinian public holidays, after terror attacks with a large number of victims, after concrete warnings by the Israeli intelligence or to put pressure on the Palestinian Authority to implement certain security measures (Ganor, 2007). Another instrument are *administrative detentions*, which are detentions without accusation and juridical proceedings. The DEF has also been used to justify the destruction of the houses of terror suspects and their families.

### **3.2 Theory and Practice**

In this section, the theory from section one is applied to real world examples from the Israel-Palestine conflict: *The Peace Process and the Oslo Peace Accords*, *Targeted Killing*, *House Destruction* and *Asset Freezing*. The first one illustrates how violent groups can shift their activities towards non-violent actions when they are integrated into the political process. This was a time when terror attacks decreased in number and the Near-East peace process was under way like at no other point in history (Baumgart-Ochse, 2008).

### 3.2.1 The Peace Process and the Oslo Peace Accords

Mainly influenced by US initiative, Israel joined multilateral negotiations with the Arab governments in the 1990s (Makovsky, 1996). Later, there were secret negotiations with the PLO. According to Makovsky, this was the first time when the PLO was actually involved in the political process when Israel firstly showed willingness to initiate a political dialogue with originally radical groups. This example illustrates that radical groups can turn moderate once the achievement of their political goals can be better reached by non-violent actions. Recall from Figure 4, that when a group decides on violent and non-violent actions, non-violent activities have to be made relatively less expensive. Like shown in section one, this will lead to a shift from violent to non-violent actions.

With the integration of the PLO into the peace process, non-terrorist activities have become relatively more attractive. Solving their optimization problem, the optimal allocation now includes less terror attacks and more political involvement through non-violent actions. This framework is especially applicable when the political goals of terror organization are clearly defined - which was the case for the PLO - but is not evident for other organizations like for example al-Qaeda (Enders and Sandler, 2006). Jones and Libicki (2008) showed through a worldwide investigation of 648 groups between 1968 and 2006 that among all the terrorist groups which stopped violence, 48% did so because they have been politically integrated and renounced violence thereafter. Military actions only lead to the breakup of 7% of the groups<sup>13</sup>. The PLO transformed from a violent terrorist organization to a pragmatic partner of the Oslo Peace Accords.

### 3.2.2 Targeted Killing

Since the beginning of the second Intifada in September 2000, the so called targeted killing has been among Israel's openly pursued strategies (Luft, 2003). According to Luft, the Israeli Supreme Court deems those killings lawful if there is an acute threat, there is no other possibility to detain the suspect and, if there is trusted secret service information about the

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<sup>13</sup>For further information why the peace process failed anyway, see Baumgart-Ochse (2008).

threat. Targeted killing consists of locating, identifying and killing Palestinian terrorists, carried out by Mossad hit men with explicit governmental approval. Mossad agents have used a broad variety of killing tactics. According to Luft, until today, dozens of Palestinians have been killed through targeted killing. This policy is especially controversial internationally but also domestically.

The question in this section is if targeted killing is an effective countermeasure from the political economy perspective. Recall Figure 2 from section one, that the most effective policies are those which affect the terrorists' resources directly, meaning that their resource constraint shifts in a parallel fashion or alternatively, both types of terror attacks have to be made relatively more expensive for the terrorist group. In section one, we argued that when terrorists only decide on which type of terror attack, transference has to be avoided. Otherwise, terrorists will shift from the relatively more expensive type of activity to the relatively less expensive one. To avoid this situation, the terrorists' total resources have to be attacked by the government since this will lead to a parallel shift of the resource constraint and therefore will limit both types of terror attacks<sup>14</sup>.

If terrorists can be arrested before they commit their assault, it is reasonable to assume that this is an effective policy. Since there are so many potential Israeli targets for terror attacks, such as government bureaus, schools, airports or sport stadiums - the capability of defensive responses is limited, since it is not possible to defend all the potential targets. Therefore, one of the most successful means to prevent terror attacks before they occur is to eliminate terrorists before they can strike (David, 2003). But the Mossad is not only pursuing individuals who are on their way to commit an attack. For example, after the assassination of 11 Israeli athletes at the Munich Olympics, Israel established the "Committee X" which oversaw missions to hunt down the members of the Black September group (Baumgart-Ochse, 2008). In the later case, we cannot assume that the assassination of that group shifts the Palestinian terrorist groups' resources as a whole since the Black September group acted as an independent Palestinian terror organization (Dobson, 1975).

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<sup>14</sup>Recall that we have assumed normal goods

It has been the Mossad's strategy to hunt down key personnel of terrorist groups (Baumgart-Ochse, 2008). PLO leader Yasir Arafat was also target of the Mossad killers but managed to escape. Israel killed many key personnel, such as Abu Jihad - Arafat's former second-in-command or Fathi Shikaki - former head of the Palestinian Islamic Jihad (Luft, 2003).

Applying the resource framework from section one (Figure 2), to evaluate the effectiveness of this strategy in the context of this paper, killings of key personnel has harmed Palestinian terrorist groups. Israel's targeted killing strategy has had some significant success: The killing of Islamic Jihad's leader Shikaki decreased their effectiveness for several years and targeted killings have harmed the effectiveness of Palestinian terrorist organizations (Ben-Yehuda, 1993). Again, from the political economy perspective and according to the framework presented here, the question is if by killing key personnel, terror groups' resources are affected as a whole. The answer is yes, if planning, leadership and tactical skills are assigned to few top persons of the group. This has been the case for Palestinian operations during the second Intifada (Baumgart-Ochse, 2008). There is only a limited amount of people who are capable of building bombs effectively or who have the charisma and leadership skills to keep the group together (Jenkins, 1987). According to Baumgart-Ochse, an additional effect of the targeted killing strategy was that Palestinian terrorists knew that they were haunted and therefore changed their behavior such as sleeping in other places every night or turning themselves in voluntarily to the Palestinian Authority to avoid being slain. In the framework under discussion, this is a form of making every kind of terrorist attacks more costly and is therefore effective in the sense of the political economy approach because it does not induce transference and the budget constraint is shifted parallelly.

But targeted killing has by no means ever stopped terror attacks on Israel completely. Targeted killing could also be an ineffective measure if groups are organized independently and the killing of key personnel does not affect its overall violent power, but may also increase anger on the Palestinian side and lead to new waves of support for the Palestinian cause. As a matter of fact, Hamas, the Islamic Jihad and the Palestinian Authority are

decentralized and consist of many cells which do not have much impact on each other (David, 2002). Recruiting of young suicide attackers goes on. According to the RAND database, after more than one year of targeted killing, Israeli fatalities reached a peak in the first half of 2002, which is a clear counter-indication for the effectiveness of that strategy.

It is difficult to provide a closing statement of the effectiveness of this counter-measure from the political economy view since there are oppositional implications, however it is possible that targeted killing has increased Israel's cost more than its benefits.

### 3.2.3 House Destruction

The Defense Emergency Regulations have been used to justify the destruction of thousands of houses of terror suspects and their families (Enders and Sandler, 2006). According to Azam (2003), the number of actions of that kind rapidly rose during the First Intifada. During the 1990s, mostly houses of suicide bombers have been attacked with the clear intention to punish the terrorist's family. *"The message conveyed through this punishment was that even though the suicide terrorist may go to the Garden of Eden according to his belief, he should be aware that his family will pay dearly for his deeds on earth"* (Ganor, 2007). Recall Figure 5, the decision tree and expected utility. These actions are an attempt to reduce the terrorists' benefit from suicide bombings. As mentioned by Ganor, suicide terrorists' families are remunerated not only by the respect of the society for their martyrdom, but also financially. Azam (2003) describes the situation as a form of inter-generational investment. So by destroying those houses, the IDF's strategy is to take away the terrorists' incentives of a noble compensation of their families.

From the political economy view, it is doubtful if these strategies are in fact effective in the sense like discussed in this paper. This strategy can only be effective if it reduces incentives for suicide terrorists. Firstly, from the framework from Figure 2 of section one, reducing incentives for suicide attacks will cause transference to other types of missions. Truly effective counter-measures will always attack the terrorists' resources as a whole. Besides that, there is evidence that those destroyed houses are re-

built quite fast with the help of organizations like Hamas or others (Ganor, 2007). So evaluating this strategy with the frameworks from section one, we will have to say that this can barely be an effective strategy.

### 3.2.4 Asset Freezing

Asset freezing of terrorists' financial resources is a measure where countries have to cooperate and, if one country defects, the effort of all other countries is undone (Sandler, 2005). Sandler calls this the "Coordination Dilemma". Freezing assets of terror groups has been among Israel's key strategies to counter terrorist financing: According to Lehmkuhler (2003), Hawalas<sup>15</sup>, charities and commodities have been the main vehicles for Middle East terror financing. On February 19th, 2006, the New York Times reported that Israel froze the tax transfers of 50 Mio. dollars to the Palestinian Authority when Hamas took control, arguing that the PA is now under control of a terror organization (NY Times, 2006). In April 2003 the United States froze the assets of a Palestinian charity called Stichting al-Aqsa, the local branch of the al-Aqsa Foundation, arguing that its humanitarian fund-raising activities were actually benefiting terrorist groups in the Middle East (Family Security Matters, 2010). Although Saudi Arabia has agreed to cooperate in asset freezing of terror groups, it does not consider blocking assets of militant Palestinian organizations like Hamas (Lehmkuhler, 2003). Since the second highest payoff to the noncooperator in Figure 9 is to not freeze assets, this scenario implies a nation can benefit by not freezing terrorists' assets and by providing a safe haven.

Recall the coordination game from Figure 9. If a nation 1 does not cooperate, this undoes the effort of nation 2. So when the European Union and the United States agree on freezing assets of Palestinian charities which were found to be fundraising vehicles for Palestinian terror groups, Saudi Arabia has to participate as well in order for the asset freezing to be effective. Otherwise, those groups will transfer their assets to safe havens. According to Sandler (2005), the coordination game describes a situation where two or more countries have to act unisono for an effective counter-terrorism policy, such as freezing terrorist assets, denying safe havens to

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<sup>15</sup>is an informal money transfer system used primarily in the Middle East, Africa and Asia. In the hawala system, money is transferred via a network of hawala brokers.

terrorists or applying sanctions to state-sponsors. When one nation breaks ranks it can ruin the effectiveness for all other nations. The matrix from Figure 9 has two Nash equilibriums in pure strategies, (freeze, freeze) and (status quo, status quo), and one Nash equilibrium in mixed strategies. This game-theoretical approach shows how the effort of all other countries can be undone by a single country which does not cooperate.

In the Israel Example, this might be true for an Islamic country like Saudi Arabia which does not participate in freezing Palestinian groups' money (Sandler, 2005). The game-theoretical analysis shows that those countries which do not cooperate have to be penalized in a way that providing a safe haven is no longer the best strategy. The policy has to reverse the ranking of A and E, so that  $A > E$ . There are two problems associated with this: Firstly, the nation that does not cooperate has to be identified and secondly, all other nations have to agree on a punishment for that country.

## 4 Conclusion

In section one, we have discussed possible answers to the question how economists look at the problem of effective counter-terrorism measures. In economics, we see terrorists as rational actors. This means that they are subject to the household maximization problem. In detail, this means that terrorists have a certain budget constraint and certain indifference curves. As a rational maximizer, the terrorists want to achieve the highest possible indifference curve, that is, that indifference curve which yields the highest utility and is feasible according to the terrorists' budget constraint. There are many practical examples which clearly show that behavior is actually predictable within this framework. If terrorists' behavior is predictable, we can formulate their best response to any anti-terrorism policy. An increase in one type of attack will lead to a substitution away to a type that is now relatively cheaper. The same is true for terrorist and non-terrorist activities. If terrorists shift from one terrorist activity to another, transference occurs. Transference is the unintended consequence of some policies which only increase the cost of a certain type of violent attack and therefore make the terrorists engage in other types. As a second step, we have introduced more advanced game-theoretical approaches to examine the need of inter-

national cooperation. We found that especially for transnational terrorism, international cooperation is crucial. And also for domestic terrorism, we must consider international influences. However, many other game forms can represent counter-measures in transnational terrorism, so the frameworks presented here are by no means exhaustive.

We discussed the Israel Example in the second section. We saw four examples which we analyzed from the political economy sense of effectiveness: The Peace Process, targeted killings, house destruction and asset freezing. From that analysis we can draw the conclusion that the political economy indeed is able to give clear statements about the effectiveness of a certain policy.

Within the frameworks presented here, we have to say that targeted killings are only effective if they reduce the terrorist group's total resource constraint. While this may be true for some charismatic leaders, it is certainly not true for the wirepuller of the Munich Olympics incident. There is also evidence that terror groups like Hamas or the Islamic Jihad are organized decentrally, which means that the killing of one person will not harm the group at all. Also, Israel will have to take into account the consequences of murdering key people, since in many cases this lead to bloody revenges of the Palestinian groups.

Of course, we will have to consider other aspects as well, which is clear for the Israel Example, thus making it a good demonstrating example: The political economy approach, almost per definition, leaves out emotions, historic evolutions or religious believes. The Israel-Palestine conflict is a territorial conflict at first glance, but it is also a religious and ethnical conflict. Targeted killing may not be effective in some cases, but the Israeli population's emotions want the government to seek revenge for example when 11 Israeli athletes were murdered by the Black September group in Munich. But this may actually be one of the key strength of this formal analysis and it is certainly a good reason why the political economy examinations should be more considered in practice.

Certainly, we will have to limit the findings of this paper: First of all, it

is always difficult to measure success associated with a certain military operations. Besides that, when we talk in game-theoretical models, costs and benefits will have to be defined, which can be difficult. For example: What is the benefit for the Israeli government if it kills the Black September group of the Munich Olympics? It may induce satisfaction to some individuals. But how can we measure this satisfaction and assign it a payoff?

Nevertheless, this approach does allow an overall assessment of Israel's policy and there may be some measures that do not play a significant role so far, but can be effective: One example is criminal prosecution, which has not been among Israel's main policies, but was quite effective when applied in a short period in the 1990s. The problem is that non-governmental actors from Palestine territories are not subject to Israeli jurisdiction, thus criminal prosecution will always require international cooperation. So far, the most effective criminal prosecution has been enforced not by the Israeli authority but by the Palestinian authority. In the middle of the 1990s, key people of Hamas and Islamic Jihad were arrested (Maoz, 2006). However, this was a period when international cooperation with the United States and Israel was still functioning.

There is strong evidence that when a democratic country faces terrorist threats from other than their own territory, it must be a key strategy to help to build rule of law and a functioning police force.

This paper can be a starting point to do more research on the right mixture of defensive and offensive responses. Also, we have to investigate the question how terror attacks can be prevented if not a terrorist group is responsible for the attack, but a single individual, like the recent incident in Norway has shown, where the right-wing extremist Anders Behring Breivik as killed 77 people and injured another 93. Further investigation can be done about the topic how the political economy approach and the models presented in this paper can be applied to investigate the effectiveness of counter-terrorism measures to prevent attacks of lone operators.

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