Choosing Sides: Terrorism, Counter-terrorism, and Social Goods Provision

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Abstract

In this paper, I present a formal model investigating the strategic competition for popular support between a terrorist group and its target government when the terrorist group provides social services. The results from this model show that terrorist groups only increase mobilization by providing social services provisions when the utility a potential supporter gains from those services increases at a faster rate than the probability of a successful attack would increase had those resources been used for military actions instead. This finding helps to explain why social provisions are only provided by a few terrorist organizations, despite the widespread belief that they aid in mobilization. The model predicts that social services are more likely to be provided when the public has great need of these services, such as in the absence of public goods provision by the government. Using originally collected club goods data from the Terrorist Organization Profiles by START, this result is strongly supported. Using an ordered logit, the results show that the provision of social services is more likely to result in a larger group when public goods are provided at low levels by the government. Additionally, once this positive impact on size has been taken into account, a negative binomial regression shows no effect of club goods on the likelihood of an attack. These results show that a terrorist organization only provides social services to increase mobilization and will do so only when this increase is sufficiently large to compensate for the loss of resources for military attacks.
On January 5th, 1995, Al-Quds radio broadcasted the following: “The Hamas movement stresses to the Palestinian people . . . that the martyrdom of leader Yahya Ayyash is part of his battle against the Zionist entity which, having usurped our people’s land, now seeks to uproot them. The Hamas movement vows before God that it will continue its jihad and resistance programme. Let the invaders and their henchmen await the movement’s response to the Zionist crime.” (BBC, 1995:1). The response to the assassination of the Hamas bomb-maker, better known as “the Engineer”, was virulent and vast. 100,000 Palestinians escorted his coffin to the Martyr’s Cemetery, holding his four-year old up, and shouting, “Retaliation! Retaliation! For the blood of this martyr” (Independent, 1996:1). In abandonment of Arafat’s ceasefire, Hamas responded with four suicide attacks against Israeli buses and other targets, killing 48 Israelis (Byman, 2006).

However, just a year prior, a successful assassination of Fathi al-Sahaqi, the leader of the Palestinian Islamic Jihad, crippled the organization for years. The immediate aftermath of both attacks closely resembled each other. Just four days after the assassination, on October 30th, demonstrations and commercial strikes were staged in the Gaza Strip and West Bank to show solidarity with the Palestinian Islamic Jihad (BBC News, 1995). What could have predicted that the PIJ would be successfully weakened by the assassination, but that Hamas would emerge even stronger, contributing to the collapse of the Peres’ Labor-led government? This paper will argue that these two reactions to counter-terrorism strikes, one which started strong but quickly weakened and another which continued to proliferate over time, can be explained by differential levels of local support.

In order to understand these different reactions, one must look at the decisions of the terrorist organization, the government, and potential supporters. Potential supporters of terrorist organizations gain utility from successful attacks and also from the benefits provided by the terrorist organization. Terrorist organizations can curry potential supporters’ favor by choosing to spend their resources on both military actions and on the provision of social
services. The benefits of providing social provisions have long been understood. Mao Tsetung argued that "the guerrilla must move amongst the people as a fish swims in the sea" (Tse-tung, 1937). Che Guevara (1998) recognized that rebel groups could gain support in villages by providing them with social services. For Guevara, this meant that rebel group success depended in part on the provision of social services. The literature is flush with examples of terrorist support to charitable and humanitarian organizations (Ly, 2007; Flanigan, 2007). Ghandour (2002) reports that Hamas devotes 95% of its budget to maintain a network of NGOs. Jihad Al Bina’a, a Hizbullah charity, provides municipal services, such as garbage removal and drinking water, to south Beirut (Fawaz, 2000). The Islamic Salvation Front provided aid more effectively to victims of an earthquake in October 1989 than the government (Ly, 2007:178). These examples and the importance of social support on recruitment raise the question of why some terrorist organizations invest heavily in club goods while others do not (Ly, 2007)?

This paper examines the interaction of terrorist and government choices and the impact of this interaction on the population through a formal model and tests a key prediction from the model. I argue that heterogeneity exists in portfolio investment for terrorist groups because terrorists face a trade-off when deciding the level of investment into club goods. When a terrorist organization provides social benefits, resources for these actions are taken directly from military actions. The provision of social services by a terrorist group on one hand can act as way for the terrorist to enhance the welfare of recruits, increasing the number of recruits (Ly, 2007). On the other hand, supplying social services reduces the amount of military expenditures, lowering the probability of a successful attack. If supporters benefit from a successful attack, one should not expect a terrorist organization to provide club goods.

This paper will use the term social services and club goods interchangeably to refer to items a terrorist organization provides to supporters. I use these terms to refer to excludable but non-rivalrous goods such as health care, water supply, or waste removal. The terms public services or public goods are used to refer to the provision of these same items by the government. Although public goods generally refer to non-excludable and non-rivalrous goods, I use this term even though the government would like to exclude terrorist supporters from use of these goods.

There are a number of reasons a terrorist supporter may benefit from a successful attack. The probability
if the success rate increases at a faster rate with an additional unit of military resources than the utility from club goods increases with an additional unit.

Moreover, the decision made by a potential terrorist sympathizer on whether to support the terrorist organization or not to is dependent not only on actions taken by the terrorist organization but also on the effectiveness and destructiveness of the counterterrorism strategy undertaken by the government. Similarly to the terrorist organization, the government also faces a trade off. The government’s counterterrorism strategy increases the government’s security by destroying the resources of the terrorist but also destroys lives and resources in the economy. When Israel assassinated Salah Shehada, a senior leader of Hamas, the bomb killing him additionally killed his daughter and eight other children (Byman, 2006). Immediately following the attack, the operations of Hamas were disrupted but popular support for Hamas, both domestically and internationally, increased. This assassination highlights the trade-off governments face and the role counterterrorism policies may play in generating support for the violent extremist movements (Pape, 2003).

Given the trade-offs both the government and the terrorist organization face, this paper has two main goals. The first is to provide insight into why some terrorist organizations invest significant resources into non-militant activities such as funding NGOs to provide social services to its population and why others do not. The second goal of this paper is to investigate how the militant activities of a terrorist organization are influenced by the decision to provide club goods and the counter-terrorism strategy of the government. In support of the first goal, the model finds that the likelihood a potential member of a population joins a terrorist organization is a function of the probability of success of an attack, the level of social services provided, and the ability of the terrorist group and government to differentiate of a concession may be higher if an attack is successful. Similarly, Bueno de Mesquita and Dickson (2007) look not at the probability of a single successful attack but instead allow the probability to represent the total probability that the armed conflict is won by the terrorist organization. In Ly (2007), a potential supporter gains utility from fostering the goals of the terrorist organization, which include successful attack. Bueno de Mesquita (2005) allow an individual terrorist to gain utility derived from being a successful terrorist. In Faria and Arce (2005) the number of new terrorist recruits is positively related to previous levels of terrorist activity. A successful attack may act as an advertisement for the terrorist organization.
between supporters and non-supporters. Depending on the marginal benefit of providing a unit of additional resources for military activities, a member of the population may become more or less likely to join a terrorist organization as social services are provided. This is an important finding: not only does it show that increasing the level of social services provided does not necessarily increase support for the terrorist organization (Ly, 2007) but it also offers key insight as to when an increase of support will occur.

If the marginal benefit gained from military activity is greater than the marginal utility increase from increased club goods, providing social services actually decreases the likelihood of a sympathizer joining the terrorist organization. Using aggregated data from 1970 to 2003, this result is tested by examining the impact of club goods provision on group size. When the marginal benefit of increasing club goods is high, the size of the terrorist organization should increase with the provision of social services. To get at this hypothesis, I look at the interaction of club goods provision and public goods provision. If a government is unable to provide social services to its population, club goods will be able to be used efficiently and should have a larger effect because they can fill this void. As an example, imagine a terrorist organization responsible for providing health services to the community (such as Hizbullah through Al Haya’a Al Sahhiyyah (Flanigan, 2007)). The medical centers will be needed in areas without government medical services. Using newly collected club goods data from the Terrorist Organization Profiles, I show that in countries with low levels of public services, the provision of club goods increases the size of the terrorist group.

Similarly this model finds that at times increasing the counterterrorism campaign is successful and at others it is not. This finding is different from that of Bueno de Mesquita (2005) where increased counterterrorism causes more economic damage thus increasing the number of supporters. In this model, if the marginal benefit of increasing the counterterrorism campaign by reducing the likelihood of success is greater than the marginal loss by damaging the economy, the number of supporters will decrease. Therefore, this model allows for conditions to exist under which the level of support will decrease for the terrorist
group in response to a counterterrorism strike even though economic damage has occurred. Under certain conditions the best response of the terrorist organization to an increase in counterterrorism is to decrease its military actions. This finding can help to explain that perhaps terrorist violence has been reduced following a counter-terrorism surge because the terrorists now find it useful to invest in public services. The first section of this paper will present a literature review, the second section will present the model, the third section will present the testable hypotheses and empirical tests, and the fourth section will summarize.

1 Literature Review

This paper builds on the current literature analyzing the importance of counter-terrorism policy and social goods provision. Signaling models have been used to investigate the role of counter-terrorism strategies on mobilization. Instead of focusing on the interaction of counter-terrorism policy and club goods for social support, Overgaard (1994) analyzed the provision of counter-terrorism in a setting of asymmetric information. In his game, the magnitude of the terrorist attack is seen as a signal of terrorist resources. When the government does not know the resource level of the terrorists, terrorists with low resource levels wish to convey a message that resources are large in an attempt to soften government retaliation. Lapan and Sandler (1993) also argue that terrorist violence may signal the strength of the terrorist organization to the government. Ginkel and Smith (1999) find that revolutionary vanguards may use terror attacks to reveal that the government is weak given their private information. Bueno de Mesquita and Dickson (2007) also investigate the role of uncertainty but instead allow this uncertainty to exist on the behalf of the supporters. Similarly to this paper, they find that counter-terrorism will increase mobilization under certain condition. They find that radicalization can result either from the economic damage caused by counterterror policies or from the information conveyed through these policies about the government’s motivations, whereas I find that increased radicalization may result from either
economic damage or club goods provision.

The impact of counter-terrorism strategies on mobilization has also been investigated without signaling models. De Figueierdo and Weingast (2001) and Rosendorff and Sandler (2004) find that government crackdowns may radicalize the moderates which in turn leads to an increase in violence. Bueno de Mesquita (2005a) develops a model showing that government crackdowns can lead to either an increase or decrease in support on terrorism, depending on the relative effect of counterterror on economic opportunity, ideology, and the future success of the terrorist organization.

This paper also builds directly on literature that has investigated the role of social goods provision on mobilization. Azam (2005) assumes that agents only care about the welfare of their descendants whom benefit from a club good with some probability. The probability of benefiting from the club good can be increased by engaging in bombing, and the agents in his model are therefore willing to give up some of their consumption today to contribute resources for the next generation. Faria and Arce (2005) present a dynamic model where the number of new terrorist recruits depends positively on the level of social support for terrorism. In this model the terrorists benefit from popular support which is assumed to depend positively on previous levels of terrorist activity and an exogenous underlying support. Berman and Laitin (2005) use Berman’s (2003) club good model to rationalize the use of suicide bombing. This model shows that the sacrifices necessary to guarantee religious club goods decrease the likelihood of defecting which thereby increases success at suicide bombing. Azam (2006) attempts to explain why some rebellion leaders are regarded as thugs while others are considered heroes. Using the example of the Eritrean Peoples Liberation Front, this paper argues that those leaders who engage in social spending are more likely to gain popular support.

Formally, this model is similar to Siqueiera and Sandler (2006). They develop a model analyzing the factors leading to terrorist survival. They find that the length of survival is dependent on the responsiveness of the grassroots supporters, the effectiveness of the gov-
ernment’s counterterrorism campaign, and the terrorist’s ability to attract outside support. In this paper, they allow the government to provide public services to the population but only allowed the terrorist to choose the level of resources used in attacks. In addition, they do not allow the government’s counterterrorism strategy to directly affect the utility of a potential supporter by decreasing the economic activity available to a non-supporter.

Substantively, the paper related most closely to this paper is Ly (2007). Ly presents a formal model explaining that different types of organizations arise in equilibrium depending on the exogenous levels of government policies. Two key differences exist between this model and Ly’s model. First, instead of assuming an exogenous strategy for the government, this model allows for strategic interaction between the government and its choice of counterterrorism strategies and the terrorist group. Secondly, charitable actions benefit terrorist supporters in Ly’s model because these charitable donations act as an advertisement to increase the potential supporter’s valuation of the terrorist organization. In my model supporters of the terrorist organization benefit directly from the provision of social services by the terrorist group.

2 Model Overview and Specification

This model attempts to capture the dynamics involved in providing social goods in order to gain support of the population. Formally, this model is adapted from Siqueiera and Sandler (2006). In their model, the government could gain support by providing public goods. The same formal framework is utilized in this model to analyze instead the consequences of the terrorist organization providing club goods. In the first stage of the game the government and the terrorist group act simultaneously, taking the best response of their counterpart as given. The government chooses the level of counterterrorism, $c$, while the terrorists determine the magnitude of their military campaign, $m$, and the amount of club goods provided, $g$. This situation is modeled as a simultaneous game because both the government and the terrorist
organization are assumed to take their actions without knowing the decision of the other first (i.e. the terrorists do not know the level of counterterrorism undertaken by the government and the government does not know the level of social goods provided by the terrorists). The terrorists in this model receive utility from campaign success (where $\psi(c, m)$ denotes failure), and from the number of supporters (denoted in the model as $(1 - \sigma)$ and the supporters’ welfare (which is increased through the provision of social goods). The assumption that the terrorist group gains utility from the welfare of its supporters in addition to the number of supporters is meant to capture the idea that the marginal productivity of the individual increases with additional wealth (Barros (1990), Siqueiera and Sandler (2006)).\(^3\) The overall utility for the terrorist group from these three components is denoted $U^T(\psi(c, m), (1 - \sigma), g)$.

The government gains utility from decreasing the likelihood of a successful attack and from consuming some type of good besides counterterrorism, denoted $x$ in the model. The utility for the government from these two components is denoted $U^G(\psi(c, m), x)$ in the model.

In the second stage of the game the potential supporters must decide whether or not to support the terrorist organization while taking the first-stage equilibrium activity levels of the government and terrorist group as given. The population therefore knows both the level of counterterrorism and the amount of social services provided and makes its decision accordingly. If a member of the population supports the terrorist organization her utility is denoted $N_T(\psi(c, m), g)$ and she gains utility from terrorist campaign success and club goods provision but loses some economic activity as she devotes more time to the terrorists and is excluded by the government. To solve this game backwards induction is used to obtain the subgame perfect equilibrium by first finding the subset of supporters for the terrorist group and then determining the first stage strategies of the government and the terrorists.

The model highlights the key trade-off a terrorist organization faces when choosing to provide club goods. A potential population member does not support a terrorist organization

\(^3\)Ly (2007) also allows for the terrorist organization to gain utility from the wealth of their supporters but does this to incorporate an altruistic component to the terrorist organization.
solely based upon club goods provision. Instead, the model allows for a potential supporter to also gain utility from a successful attack. Solving for the individual indifferent between supporting and not supporting the organization, the model shows that a terrorist organization will only gain support by increasing their social goods provision when the marginal utility a terrorist supporter gains from increasing the likelihood of a successful attack is less than the marginal utility gained from increasing the club goods expenditure. In other words, the size of a terrorist organization is not a monotonically increasing function of club goods expenditure. Providing club goods is only beneficial to the mobilization of a terrorist organization when the supporters benefit more from this provision compared to utilizing the same resources on military attacks.

The likelihood of the marginal utility from club goods increasing at a faster rate than the probability of a successful attack increasing should be larger when the supporters of the terrorist organization need these club goods. If the government is unable to provide these services, the population must look to the terrorist organization to provide them. As explained in the introduction, terrorist organizations such as the Islamic Salvation Front, LTTE, Hizbullah, and Hamas often provide services like trash removal, drinking water, health care, and a postal service, that typically are considered under the government’s purview.

The model additionally shows that the ability to correctly distinguish supporters from non-supporters is important for understanding how club goods provision impacts the utility of a terrorist supporter. As the ability of the terrorist group to correctly distinguish supporters from non-supporters decreases, the utility gained from joining the terrorist organization also decreases. This occurs because the marginal utility derived by a supporter from club goods decreases as non-supporters are more likely to “incorrectly” obtain these goods. In this situation, a terrorist group will benefit more from increasing military attacks as opposed to spending resources on club goods.

A supporter of the terrorist organization is also impacted by the counterterrorism campaign of the government. One the one hand, increased counterterrorism decreases the prob-
ability of success for the terrorist organization, lowering the utility of a supporter. On the other hand, increased counterterrorism causes more economic damage, lowering the opportunity cost of becoming a terrorist supporter. Examining the individual indifferent between supporting and not supporting the terrorist organization, the model shows that support for the terrorist organization will only decrease if the rate of economic damage occurs faster than the rate of destruction of terrorist resources.

Solving the simultaneous decision of the government and the terrorist organization reveals that the level of counterterrorism and club goods provided also depends on tradeoffs. The terrorist organization gains utility from both the number of supporters and the wealth of these supporters and also from a successful attack. Since providing club goods decreases the number of resources used for military attacks, a terrorist organization will only provide club goods under certain conditions. When providing club goods increases the size of the terrorist group, the terrorist group will increase club goods provision so long as the benefit gained from increasing both the wealth and number of supporters is greater than the benefit of increased success had these resources been used in military attacks. In fact, since the only benefit to a terrorist organization from club goods comes from its impact on size and wealth of supporters, the likelihood of a terrorist attack should decrease when club goods are provided once size is taken into account. The model also finds that when an increase in counterterrorism policies leads to an increase in mobilization, the terrorist group will decrease its military attacks and increase their level of club goods provision. This finding helps to explain why terrorist organizations often appear weakened in the short run only to reemerge stronger at a later date.

The government on the other hand gains utility from both decreasing the likelihood of a successful attack and from decreasing the level of terrorist support. The model shows that even when the level of support increases with an increase in counterterrorism a government may still increase its counter-terrorism policy so long as the benefit derived from decreasing the probability of success of current attacks is worth more to the government than decreasing
the number of supporters. This finding helps to explain why a government finds it difficult to endure a high level of current attacks even if this means less overall strength to the terrorist group in the long run.

2.1 Nash Equilibrium

To solve this game, I use backward induction to find the subgame perfect equilibrium. In doing so, I first solve for the proportion of terrorist supporters, taking the first-stage equilibrium behavior of the two adversaries as given. I then solve for these first-stage choices of the terrorist organization and the government. Since the terrorist organization and the government act simultaneously in the first stage, I find the Nash Equilibrium of this subgame. I show that this Nash equilibrium exists in the appendix. Thus my game has a solution.

Empirically, however, I am less interested in this solution than in the ways in which the actors respond to each others’ decisions in this equilibrium; e.g., how the proportion of terrorist supporters changes with an increase in club goods. This cannot be found by looking at the comparative statics of the game, as club goods are endogenous. As such, I focus my second stage analysis instead on the impact of club goods on the proportion of supporters. Practically, this means that in my analysis of the second stage I concentrate on the change in the proportion of supporters as a function of club goods provision. Similarly, I am interested in the way terrorist groups and the government react to each other; therefore, in my analysis of the first stage I concentrate on the shape of the best response curve of each actor to the actions of the other actor.

2.2 The Population

Since backwards induction is used to solve this model, the population of potential supporters of the terrorist organization must be analyzed first. The population is assumed to care not only about the success of the terrorist group but also about the level of public services
provided and the economic activities available. I let $n$ represent the total population from which supporters for the terrorist organization can be drawn. In order to capture heterogeneous attitudes towards the terrorist organization, I follow Siquiera and Sandler (2006) and let the supporters be distributed on the unit interval $[0, 1]$ and indexed by $\sigma$. Those individuals with a higher $\sigma$ gain a higher level of utility from supporting the terrorist group. The population is therefore characterized by type $\sigma_i$ because some individuals are assumed to ideologically support the terrorist group more than others.\(^4\) In addition to the utility gained from her preference for the group (denoted by $\sigma$), a member of the population also gains utility from the expected payoffs associated with the terrorist group’s success or failure. A terrorist supporter gains $v_s$ from a terrorist group’s success and $v_f$ from the terrorist’s failure.

The probability of success is assumed to be dependent on the level of counter-terrorism undertaken by the government, $c$, and the level of military resources invested by the terrorist organization, $m$. I let $\psi(c, m)$ represent the probability that the terrorist group is unsuccessful in its goals (and $(1 - \psi(c, m))$ represent the probability that the terrorist group succeeds). It is assumed that as the level of counter-terrorism increases, the probability of success decreases and that as the level of military resources invested by the terrorist organization increases the probability of success also increases. The functions are assumed to be concave in $c$ and convex in $m$ in order to capture decreasing returns. Mathematically this means $v_s > v_f$, $\frac{\partial \psi}{\partial c} > 0$, $\frac{\partial^2 \psi}{\partial c^2} < 0$, $\frac{\partial \psi}{\partial m} < 0$, $\frac{\partial^2 \psi}{\partial m^2} > 0$. It is also assumed that a supporter gains more utility from success than from failure. Following Siqueira and Sandler (2006), in order to capture the risk terrorists face by exposing themselves when they increase their military actions, the sign of $\frac{\partial^2 \psi}{\partial c \partial m}$ is positive indicating that an increase in terrorist’s action increases the ability of the government to discover them. White (2003) highlights the fact that a weak opponent gains an advantage by remaining hidden in asymmetric warfare and loses this advantage as they increase the magnitude of their attack.

\(^4\)For this model the simplifying assumption is made that type is uncorrelated with economic activity. Allowing this correlation might be interesting for future work.
In addition to gaining utility from success and her innate level of support ($\sigma$), a supporter of the terrorist group also obtains utility from the level of social services provided ($h(g)$). It is assumed that as social services increase, the utility gained from these public services also increases but at a decreasing level ($\frac{\partial h}{\partial g} > 0$, $\frac{\partial^2 h}{\partial g^2} < 0$). Following the logic of Siquera and Sandler (2006), I assume that a fraction of the club goods are also provided to non-supporters because the supporters and non-supporters cannot be perfectly identified by the terrorist group. I denote this $\theta$.

Following Bueno de Mesquita (2005a) this model assumes that the government’s counter-terrorism strategy causes damage to the economic environment, which is represented by $\tau(c)$.

I assume that as the counterterrorism strategy increases, the damage also increases but at a decreasing rate ($\frac{\partial \tau}{\partial c} > 0$, $\frac{\partial^2 \tau}{\partial c^2} < 0$). This function allows me to capture the two opposing effects of the counter-terrorism strategy. On the one hand an increase in counterterrorism increases the likelihood of failure by the terrorist organization (captured by $\frac{\partial \psi}{\partial c} > 0$) and on the other an increase in counterterrorism decreases the utility of being a non-supporter by increasing economic damage. As with a non-supporter, I assume that a fraction of economic activity will be available to a terrorist group supporter (denoted $\gamma$) due to the government’s inability to correctly identify supporters. A terrorist supporter will partake in the economy at a decreased rate because of both exclusion by the government and time spent with the terrorist organization. By including in the utility equation of a supporter both a positive component determined by the probability of success (dependent upon the level of military resources) and a positive component determined by club goods, this utility equation captures the tradeoff between increasing militant efforts or increasing club goods. The marginal impact of both $m$ and $g$ will determine when mobilization increases or decreases following an increase in club goods expenditure.

5I assume that as the level of counterterrorism increases, the destruction to the economic environment grows stronger ($\tau'' > 0$). As an example, if a few bombs are dropped, a few businesses may have to shut down. However if an entire city is bombed, the entire economic system shuts down.

6As stated earlier, for simplicity it is assumed that type does not impact utility from economic activity. This could be included by allowing $(1 - \tau(c))f(\sigma_i)$ to represent this utility.
The utility for a supporter therefore equals $N^T$ where:

$$N^T = \psi(c, m)v_f + (1 - \psi(c, m))v_s + \bar{h}(g) + \gamma(1 - \tau(c)) + \sigma$$  \hspace{1cm} (1)

A non-supporter gains utility from the portion of social services she can receive and from actively participating in economic activity (which she is less able to do if she supports the terrorist organization).

The utility of a non-supporter equals:

$$N^{\sim T}(c, m) = \theta\bar{h}(g) + (1 - \sigma) + (1 - \tau(c))$$  \hspace{1cm} (2)

In order to simplify, the budget constraint for the terrorist organization must be taken into account. I assume that the terrorists have a fixed amount of resources, $T$, which can be spent on club goods provision, $g$, and military attacks, $m$, where $\alpha$ represents the per unit costs of the terrorists' effort directed towards military actions. Thus the budget constraint gives us $g = T - \alpha m$. Solving for the individual indifferent between supporting and not supporting the organization gives:

$$\hat{\sigma} = \frac{1}{2}[h(T - \alpha m) - \psi(c, m)v_f - [1 - \psi(c, m)]v_s + 1 + (1 - \gamma)(1 - \tau(c))]$$  \hspace{1cm} (3)

where $h(g) = (1 - \theta)\bar{h}(g)$ and $\frac{\partial h(g)}{\partial g} > 0$, $\frac{\partial^2 h(g)}{\partial g^2} < 0$.

The partial derivative with respect to military resources will allow us to investigate how support for the organization changes with an increase to military expenditure.

$$\frac{\partial \hat{\sigma}}{\partial m} = -\frac{1}{2}[\alpha \frac{\partial h}{\partial m} + \psi'(c, m)[v_f - v_s]] \geq 0$$  \hspace{1cm} (4)

From this result two cases are found. Details in Appendix. In the first case, termed “High Success”, the marginal utility a population member gains from increasing the likelihood of
successful attack is greater than the marginal utility gained from club goods consumption. Therefore the overall effect of increasing military expenditures is negative. This means that $\hat{\sigma}$ decreases in $m$ and the terrorist group gains support by increasing the level of militant activities. If the opposite situation occurs, called "Low Success", the marginal utility gained from club goods consumption is greater than the marginal utility gained from increasing the likelihood of a successful attack. Here $\hat{\sigma}$ increases and the terrorist group loses support by increasing the level of militant activity. These situations can be summarized as follows:

**Proposition 2.1.** When the marginal utility a potential population member gains from increasing the likelihood of a successful attack is greater than the marginal utility gained from club goods expenditure, a terrorist group will gain support by increasing their military actions. When it is not the terrorist group will lose support by increasing their military attacks.

These two cases are interesting because they highlight the fact that not all terrorist groups benefit from increasing club goods provision. In particular if providing club goods is likely to have a small impact or providing military resources is likely to have a drastic impact, the terrorist organization will increase mobilization by not providing social services and instead increasing militant activities. This situation may occur when the terrorist organization has a concentrated minority to whom they can administer the club goods to or the terrorist group is already providing a large amount themselves so that the marginal impact of providing an additional unit of goods is small given the decreasing returns. If the terrorist group has few resources to begin with, the marginal effect of providing additional military resources would be large. In a similar argument, if the government is providing public goods to the potential supporters, club goods will have a smaller impact. If however the region does not have public goods, the terrorist organization can fill this void by providing club goods. These club goods should have a larger impact on increasing popular support when the terrorist organization is able to meet this needed demand.

Club goods provision may also be non-beneficial when the terrorist is not able to distin-
guish supporters from non-supporters and is forced to provide club goods to all members of the population. If this is the case, as $\theta$ increases, the disutility from remaining a non-supporter decreases because club goods are able to be obtained without providing support. In this situation, the terrorist group will benefit more from increasing military attacks. This is summarized below.

**Proposition 2.2.** *When the ability to distinguish terrorist supporters from terrorist non-supporters decreases, the terrorist group will lose support by increasing club goods.*

In addition to analyzing whether club goods provision increases or decreases the threshold necessary for mobilization, the role of the government’s counter-terrorism strategy must also be investigated. The partial derivative with respect to counterterrorism magnitude can be used to investigate how support for the organization changes with an increase in counterterrorism.

$$\frac{\partial \hat{\sigma}}{\partial c} = -\frac{1}{2} \left[ \frac{\partial \psi}{\partial c} [v_f - v_s] + (1 - \gamma) \frac{\partial \tau}{\partial c} \right]$$

Similarly to the terrorist group, sometimes the government will wish to increase its amount of counterterrorism and sometimes it will wish to decrease it. Details on the cases are included in the Appendix. When the marginal amount of damage caused to the economy is greater than the marginal benefit gained by decreasing the likelihood of success for the terrorists, an increase in counterterrorism will lead to more support for the terrorists because non-supporters will be drastically hurt by the economic damage. This may occur if the government is unable to use targeted attacks and instead hurts the entire population or where the economic opportunities are already low so a small amount of damage has a large negative effect. In this case the government will not wish to increase its counterterrorism strategy. If however, the damage to the economy is small (perhaps the government launches targeted strikes or damages a small amount in a flourishing economy) the government will wish to
increase counterterrorism used against that terrorist group because the relative marginal
damage is low. When governments have the ability to correctly identify terrorist supporters,
the costs to joining a terrorist organization are larger because economic participation will be
lowered. This causes support for the terrorist organization to drop.

These results can be summarized as follows

**Proposition 2.3.** *If the damage caused by the counterterrorism campaign is greater than
the marginal benefit of increasing the likelihood of failure, an increase in counter-terrorism
actions will increase support for the terrorist organization. If this is not the case, an increase
in counterterrorism activities decreases support for the terrorist organization.*

**Proposition 2.4.** *When the fraction of economic activity available to a terrorist supporters
is lowered, support for the terrorist group decreases.*

By taking the counter-terrorism strategy of the government and the social services pro-
vision of the terrorist organization as fixed, this section has shown that in some cases the
terrorist organization gains mobilization by offering club goods (when the benefit to the
population outweighs the loss of effectiveness in attacks) and that sometimes a government
benefits from increasing counterterrorism (when this increase causes more damage to the
terrorist organization than the economy). Given these impacts, I now turn to the simulta-
neous decision of the government and the terrorist organization to determine what level of
resources they should use/offer.

### 2.3 Terrorist Group

The simultaneous game is analyzed by first looking at the terrorist group. The terrorist
organization gains utility not only from the level of supporters but also from the probability
of a successful attack. It is assumed that a successful attack generates direct utility for
the terrorist organization because any goal the terrorist organization wishes to obtain is
assumed by the definition of terrorism to be obtained through violent means. The goals of the
terrorist organization can represent anything from gaining concessions from the government to successfully attacking a target. The definition of goals is purposively left general in order to capture a number of different scenarios. What matters for the terrorist organization is that the violent means must be successful in order to achieve their goal. In addition the terrorist group gains utility from the number of supporters it has (which b/c of uniform distribution is just $1 - \hat{\sigma}$) and its welfare. The terrorist organization gains utility from the welfare of their supporters because the marginal productivity of the individual is assumed to increase with additional wealth. Bueno de Mesquita (2005) and Berrebi (2007) show that a terrorist organization often selects those with the highest level of skills. The utility received from the proportion of supporters and their wealth is represented by $\mu$. Since the terrorist organization gains utility from the welfare of their supporters, I assume that $\mu$ is increasing at a decreasing rate in $g$. The terrorist organization receives $S$ from success and $\bar{S}$ from failure.

The utility function for the terrorist organization is:

$$U^T = (1 - \psi(c,m))S + \psi(c,m)\bar{S} + \mu(T - \alpha m, (1 - \hat{\sigma}))$$

(6)

We normalize $\bar{S}$ to zero. Thus the utility function becomes:

$$U^T = (1 - \psi(c,m))S + \mu(T - \alpha m, (1 - \hat{\sigma})n)$$

(7)

where we let $g = T - \alpha m$ and $p = (1 - \hat{\sigma})$, and $\frac{\partial \mu}{\partial g} > 0, \frac{\partial \mu}{\partial p} > 0, \frac{\partial^2 \mu}{\partial g^2} < 0, \frac{\partial^2 \mu}{\partial p^2} < 0, \frac{\partial^2 \mu}{\partial g \partial p} > 0.\footnote{The sign on $\frac{\partial^2 \mu}{\partial g \partial p} > 0$ captures the idea that the need for productive and skilled members is needed more as the group grows. A larger terrorist organization is able to specialize in attack types and in tasks, and has a need for skilled specialized behavior.}$

The terrorist organization wishes to maximize its utility, and this is found by taking the FOC.

$$\frac{\partial U^T}{\partial m} = -\frac{\partial \psi(c,m)}{\partial m} S - \alpha \frac{\partial \mu}{\partial m} - \frac{\partial \mu}{\partial m} \frac{\partial \hat{\sigma}}{\partial m} = 0$$

(8)
In the FOC the first term is the terrorist’s marginal benefit to attacks from increasing terrorist activity, the middle term is the loss due to not providing goods to finance their supporters, and the third term is the net contribution from the number of supporters (which can be positive or negative). The terrorists will choose their behavior given the costs (loss of $g$ and perhaps $p$) and benefits (gains from $(1 - \psi)$ and perhaps $p$). When providing club goods is beneficial for the terrorist group ($\frac{\partial \sigma}{\partial m} > 0$), the terrorist organization will increase club goods provision so long as the benefit gained from increasing both the wealth and the number of the supporters is greater than the cost of decreased success. One might expect this to be the case in situations where the terrorist organization is dependent on the population for cover or when the target countries’ counter-terrorism policies harm the population of potential supporters. This is exactly the case we would expect to find when a regionally concentrated minority group exists, so the same variable which increases the marginal benefit to supporters of club goods also increases the benefit to terrorist groups from gaining those supporters. The model also shows that a terrorist organization’s benefit from club goods with respect to attack success comes from increased size only.\(^8\) Therefore, once the positive impact of size is accounted for in the probability of success, club goods should not increase the likelihood of an attack. Indeed, if anything, once size has been accounted for, the provision of club goods should actually decrease the likelihood of attacks because resources have been taken away from military attacks. These results can be summarized as follow:

**Proposition 2.5.** *When providing club goods increases the size of the terrorist group, the terrorist organization will increase club goods provision so long as the benefit gained from increasing both the wealth and the number of supporters is greater than the benefit of increased success if instead those resources were used on military attacks.*

**Proposition 2.6.** *The terrorist organization only benefits with respect to attacks from increased club goods provision due to an increase in its size. Once the effect of size has been accounted for in the probability of success, club goods should not increase the likelihood of an attack. Indeed, if anything, once size has been accounted for, the provision of club goods should actually decrease the likelihood of attacks because resources have been taken away from military attacks.*

---

\(^8\)The terrorist organization also receives utility directly from the provision of club goods due to the increase in supporters’ welfare.
taken into account, club goods should decrease the probability of success because these resources can no longer be used on attacks.

Another factor that may be of interest is how the terrorist’s utility changes with an increase in counterterrorism.

\[
\frac{\partial U}{\partial c} = -\frac{\partial \psi}{\partial c} S - \frac{\partial \mu}{\partial p} \frac{\partial \sigma}{\partial c} \quad (9)
\]

If an increase in counter-terrorism policies decreases support, the terrorist organization loses utility from an increase in counterterrorism. If support increases in response to an increase in counterterrorism policies, the terrorist organization will gain utility only when this increase in support outweighs the loss of attack success. Implicit differentiation is used to determine how the behavior of the terrorist organization will change when the government changes its counterterrorism strategy:

\[
\frac{\partial m}{\partial c} = \frac{\partial^2 \psi}{\partial m \partial c} S - \alpha \frac{\partial^2 \mu}{\partial g \partial p} \frac{\partial \sigma}{\partial c} - \frac{\partial^2 \mu}{\partial p^2} \frac{\partial \sigma}{\partial m} + \frac{\partial \mu}{\partial g} \frac{\partial^2 \sigma}{\partial m \partial c} - \frac{\partial^2 \psi}{\partial m^2} S + \alpha^2 \frac{\partial \mu}{\partial g^2} + \alpha \frac{\partial^2 \mu}{\partial g \partial p} \frac{\partial \sigma}{\partial m} + \frac{\partial^2 \mu}{\partial p^2} \left( \frac{\partial \sigma}{\partial m} \right)^2 - \frac{\partial \mu}{\partial p} \frac{\partial^2 \sigma}{\partial m \partial p} \quad (10)
\]

While many cases exist (please see the appendix for a discussion of the cases), a key finding is that if an increase in counterterrorism policies leads to an increase in mobilization for the terrorist group, the terrorist group becomes more likely to increase their level of club goods provisions at the cost of fewer resources devoted to attacks. This finding can help to explain why violence often restarts following an initial period of decrease in intensity for the terrorist group. In the short run the terrorist organization is choosing not to provide resources to terrorist attacks and is instead investing in social provisions. Once the terrorists have increased their support, they may choose to restart their campaign of attacks again now that they are stronger.

Lemma 2.7. If an increase in counter-terrorism policies leads to an increase in mobilization for the terrorist group, the terrorist group becomes more likely to decrease military attacks and instead provide club goods.
2.4 Government

While the government is interested in decreasing terrorist attacks, the government must also provide a number of other goods and services to remain in office. To incorporate this, the government must pay a cost for engaging in counter-terrorism (denoted $k(c)$). The government also gains some utility from each member of the population who does not join the terrorist (either through their economic activity or through satisfaction from preventing support for terrorists) and I call this $\delta \hat{\sigma}$. The utility for the government from these components is denoted $U^G$ in the model.

\[
U^G = \psi(c,m) - k(c) + \delta \hat{\sigma}
\]  

(11)

where $k' > 0$, $k'' > 0$.

As stated above, to find out the maximal amount of $c$ to use given a level of $m$, the FOC (second order conditions are in the appendix) are used:

\[
\frac{\partial U^G}{\partial c} = \frac{\partial \psi}{\partial c} + \delta \frac{\partial \hat{\sigma}}{\partial c} - \frac{\partial k}{\partial c} = 0
\]

(12)

Taking the FOC shows the government’s optimal amount of $c$ to use given a level of $m$. Even when the level of supporters increases with an increase in counterterrorism ($\frac{\partial \hat{\sigma}}{\partial c} < 0$), so long as the benefit to the government from decreasing the likelihood of current attacks is worth more to the government than the utility from decreasing the number of supporters, the government will increase its counterterrorism levels. This case helps to highlight a key problem faced by particularly a democratic government. As long as the probability of success today is decreased, it is difficult for the government to decrease their level of counterterrorism. Particularly because the terrorist organization will often decrease its magnitude of attacks in response to an increased counterterrorism policy, a democratic government may find it
difficult to sacrifice a high level of current attacks today at the benefit of less attacks in the future even if this future benefit is greater.\textsuperscript{9}

Implicit differentiation is used to analyze exactly how the government’s counterterrorism strategy will change with an increase in terrorist activity.

\[
\frac{\partial c}{\partial m} = -\frac{\partial^2 \psi}{\partial c \partial m} + \delta \frac{\partial^2 \hat{\sigma}}{\partial c^2} - k'' > 0
\]  

(13)

This tells us that the government’s best response curve is positively sloping and that in response to an increase in militant activities the government should increase its counterterrorism efforts.

\[
\frac{\partial U^{\text{G}}}{\partial m} = \frac{\partial \psi}{\partial m} + \delta \frac{\partial \hat{\sigma}}{\partial m}
\]  

(14)

When the number of supporters increases with military resource allocation, the government’s utility is decreasing as the terrorist organization increases its military focus. However, when the terrorist organization instead focuses on club goods because this increases the number of supporters, the government may still receive a decrease in utility as long as the decrease to attack strength from losing resources to attacks is less than the loss of utility from decreasing popular support.

3 Testable Hypotheses

This model generates multiple testable hypotheses, for example propositions 2.1-2.6 and lemma 2.7. I am going to be best two of these (proposition 2.1 and 2.6). The first states that public goods provision should decrease the marginal effect of club goods on size. This translates into an expectation of a negative and significant interaction term on public goods*club goods. The second states that club goods should affect attacks through increasing the size

\textsuperscript{9}I plan to allow for this explicitly in future research through a repeated game.
of the group, and so should not have a positive effect on the number of attacks.

### 3.1 Hypothesis 1: Impact of Club Goods on Group Size

This model generates multiple testable hypotheses. Hypotheses generated from the decision of the population to join or not join the terrorist organization can be examined by looking at the size of the terrorist group. If the proportion of supporters \((1 - \hat{\sigma})\) increases, the size of the terrorist organization should also increase. From Proposition 2.1, when the marginal utility gained from club goods surpasses that of military expenditures, club goods will increase the proportion of supporters and will therefore be provided. In order to determine when this arises, the conditions under which a group is likely to benefit from club goods provision must be examined. If a government does not provide public goods the terrorist organization can take advantage of this void and provide club goods. Given this, a terrorist organization operating within a country whose government does not provide sufficient public goods should be more likely to benefit from the provision of club goods. On the other hand, a terrorist group operating in a country with sufficient public goods should be less likely to benefit from the provision of club goods. In the statistical model examining the size of the terrorist organization, this means that the interaction term of club goods and public goods should be negative. As the government provides more public goods, the impact of club goods on size should decrease.10 Since the constituent term of club goods represents the impact of club goods on size when public goods are at zero, I assume that this impact should be positive, indicating that without public goods, club goods will increase the size of the terrorist organization.

**Hypothesis 1.** *public goods provision should decrease the marginal effect of club goods on size. This translates into an expectation of a negative and significant interaction term on*

---

10Ideally, a alternate test of this hypothesis would examine the same terrorist group over time. The data for club goods provision, newly collected for this paper, only dichotomously categorize the terrorist organization as either a provider of club goods or not and do not change over time. Given this limitation to the data, this test cannot be conducted at this time.
It is difficult to predict the impact of public goods on group size when club goods provision is at zero. According to Siqueiera and Sandler (2006), the size of the terrorist group will often decrease following an increase to public goods provision. The size decreases because the benefit from not supporting the terrorist group increases as the government provides more public goods. On the other hand, Condra et al (2010) explain that increased public goods provision may increase communication among terrorist group members and potential supporters, leading to an increase in recruitment. Given these contrasting theoretical expectations, it is difficult to know whether public goods will increase or decrease the size of the terrorist group.

In order to test the above hypothesis regarding the size of the terrorist group, an ordered logit is used due to the categorical dependent variable.\footnote{All thresholds are significantly different from each other.} This variable is explained below. The unit of analysis is the terrorist group. The estimation sample covers 411 terrorist groups. All country level variables are collected from 1970 to 2003 and are collapsed to their mean. Standard errors clustered on the terrorist group are used but results are unchanged when using robust standard errors.

The statistical model tested is:

\[
\text{size} = \beta_0 + \beta_1 \text{club goods provision} + \beta_2 \text{public goods provision} \\
+ \beta_3 \text{club goods provision} \times \text{public goods provision} \\
+ \text{controls}
\]

with controls = \(\beta_4\log\text{ of per capita income of home country}\+\beta_5\text{population of home country}\+\beta_6\text{democracy of home country} + \beta_7\text{democracy squared of home country}\).
decreased economic options. Bueno de Mesquita (2005) theorizes that economic damage causes all potential supporters to increase their level of support while the terrorist organization selects those with the highest level of skills (Berrebi, 2007). Given these theories, the sign on log of per capita income may be positive or negative. Latent support for the terrorist organization will increase in response to a decrease in wealth, but due to selection by the terrorist organization, this may not translate into a larger terrorist group. The size of the population of the home country is included as a terrorist organization may have an easier time recruiting with a larger population base. The sign on population of home country is expected to be positive. The square of the democracy level is included as mobilization should be easier for terrorist groups in semi-democratic countries. In autocratic countries, the terrorist group may be unable to mobilize due to lack of freedom of movement. In democratic countries, a terrorist group may have a harder time generating support due to legal alternatives. In those countries in the middle however, terrorist groups should have an easier time mobilizing.

Data for the size of the terrorist group will come from Asal-Rethemeyer BAAD1-Lethality Terrorism Data and the Terrorist Organization Profiles from the START Terrorism Knowledge Base. The size of the group is coded as a 0 if the group is between 0-100 or if confidence is low, 1 if the group is between 100-1,000, 2 if the group is between 1,000 to 10,000 and a 3 if the group is greater than 10,000. For groups not included in the BAAD1-Lethality Terrorism Data, the Terrorist Organization Profiles were used if available.

Club good expenditure was obtained from the Terrorist Organization Profile in the START Terrorism Knowledge Base. This database provides a verbal description of the activities of 854 terrorist groups. If this description includes a reference to social services, these groups are coded as a 1 for high club goods provision. This newly collected data

---

12 These contrasting predictions raise a concern with the data on size. If the size of the terrorist organization includes only active terrorist members the expectation is different than a measure that includes all potential supporters. In future research, I hope to collect data on public opinion polls for Palestinian terrorist organizations to create a testable measure more accurate to this theory.

13 The State Department’s descriptions of Foreign Terrorist Organizations and the ICT Database have
greatly expands the dataset used by Berman and Laitin (2008).\footnote{Berman and Laitin (2008) used the ICT database. The ICT database uses the State Department’s Background Information on Foreign Terrorist Organizations. This database provides a verbal description of the activities of 31 terrorist groups.}

Data on government spending on public goods is proxied through energy consumption obtained from the Correlates of War (COW). In countries with higher public goods provision, energy consumption for that country should also be higher, as electricity itself constitutes a public good.\footnote{The energy consumption is measured in billions of coal ton equivalents.} A robustness check is run using a measure of final government consumption(\% of GDP) provided by the World Bank’s Development Indicators (WDI). All major results remain unchanged.

The democracy measure will be taken from Polity projects policy2 variable (Marshall, Jaggers, and Gurr, 2006), which runs from -10 to 10. Since democracy will have to enter the regression in a non-linear fashion, in particular squared, the polity measure will be transformed to range from 0 to 21. Average per capita income also comes from the World Bank data and will be used logged. The measure for the size of the country will come from the Correlates of War (COW) (Siner, Bremer, Stucky, 1972).\footnote{The population is measured in millions.}

\begin{table}[h]
\centering
\begin{tabular}{lcc}
\hline
\textbf{Variable} & \textbf{Coefficient} & \textbf{(Std. Err.)} \\
\hline
club goods & 4.198 & (1.162)** \\
energy consumption & 0.620 & (0.229)** \\
club goods * energy consumption & -0.977 & (0.431)** \\
log gdp per capita & -0.866 & (0.154)** \\
population & -1.933 & (0.884)** \\
democracy & -0.041 & (0.087) \\
democracy\textsuperscript{2} & 0.004 & (0.004) \\
Cut 1 & -5.993 & (1.165) \\
Cut 2 & -4.486 & (1.154) \\
Cut 3 & -2.321 & (1.188) \\
\hline
\end{tabular}
\caption{Estimation results : Ordered Logit}
\end{table}

The results in Table 1 support the hypothesis that club goods increase the size of the
terrorist organization and that a terrorist group will only provide them when they do so. The descriptive statistics show that terrorist organizations do not provide club goods unless they increase their size. 78% of terrorist organizations who provide club goods have at least 1,000 members (categories 2 and 3).\textsuperscript{17} No terrorist organization which provides club goods is smaller than 100 members.\textsuperscript{18} 44% of terrorist groups who provide club goods are larger than 10,000 members and for all terrorist groups this size, public goods provision by the government is less than the 25th percentile.

The ordered logit regression provides further support to these descriptives. When public goods provision is zero, the effect of club goods is positive and significant on size. The interaction of club goods and energy consumption is negative and significant as predicted. This shows that club goods provision has a weaker impact as more public goods are provided, which is predicted by the formal model. Substantively the effect is also quite large. At 5th percentile, the probability that a terrorist organization is small (between 0 and 100 members) decreases by 64% when a terrorist organization provides club goods. However, at the 95th percentile, the probability that a terrorist organization is small (between 0 to 100 members) only decreases by 45%. Therefore, at a high level of energy consumption (95th percentile), a terrorist organization is 29.7% more likely to be small (between 0 to 100 members). However, even at high levels of energy consumption a terrorist organization is still unlikely to be small. This supports the finding in the model that a terrorist organization will only provide club goods when it is beneficial to do so. On the other side of the spectrum, providing club goods when energy consumption is at the 5th percentile increases the terrorist group’s probability of being at least 10,000 members by 42%. At the 95th percentile, providing club goods only increases the terrorist group’s probability of being at least 10,000 members by 31%. Thus at a high level of energy consumption, a terrorist group is 26% less likely to be at least 10,000 members.

\textsuperscript{17} Contrasted with only 15.6% overall.
\textsuperscript{18} However, 61% of all terrorist organizations are between 0 to 100 members.
The control variables show that income and population size reduce the size of the terrorist group. An increase in the poverty level of the home country increases the size of the terrorist group. However, given the relationship between poverty and population size with public goods, it is difficult to know how to interpret the results on population. Perhaps a larger population makes coordination among terrorist supporters more difficult as members may be more dispersed. Future research should include a measure of concentration to better understand the impact of population on group size. The level of democracy does not have a significant impact.19

3.2 Hypothesis 2: Impact of Club Goods on Count of Terrorist Attacks

The second testable hypothesis from the model examines the impact of club goods provision on the likelihood of an attack controlling for size. In the model the only positive benefit from club goods provision comes from an increase in size and an increase to the wealth of an individual. According to this model, once size has been accounted for, an increase in club goods provision should decrease the likelihood of an attack. This result follows because the terrorist organization must use resources from military attacks on club goods. In contrast and unaccounted for in my model, Berman and Laitin (2008) explain that club goods help to decrease defection, increasing the efficacy of the remaining resources for military attacks. If this is the case, club goods may lead to an increase in militant activity even accounting for size. Given these contrasting expectations, it is also possible for club goods to have no impact once size is accounted.

Hypothesis 2. If club goods only impacts the likelihood of an attack through size as predicted by this model, an increase in club goods should decrease the likelihood of an attack.

When examining the second hypothesis, the aggregate count of attacks in analyzed. a

19Asal and Rethemeyer (2010) also find no impact of democracy on the origination country.

28
likelihood ratio test determined that a negative binomial model is appropriate. Overdispersion occurs both because terrorist acts are a rare event and are unlikely to be independent across terrorist groups.\textsuperscript{20} The unit of analysis is the terrorist group-country dyad.

To operationalize the magnitude of military actions, the aggregate number of attacks by a particular terrorist group from 1970 to 2003 is used.\textsuperscript{21} The theory proposed here is applicable to both transnational and domestic terrorism once size is taken into account. In addition the dependent variable needs to measure not only the number of terrorist attacks in a given country year but must also capture the dyadic interaction between the terrorist group and the targeted country. Given this interest in both domestic and transnational dyadic attacks, the Global Terrorism Database by START will be used.\textsuperscript{22}

Controls are included for both the home country and the target country. The controls for the home country are the same as in the model for hypothesis 1: log of per capita income, population, and quadratic democracy. The expectation for these controls are the same as for size, as a larger terrorist group is expected to launch more attacks. The controls for the target country are: population, log of gdp per capita, and democracy. Population of the country should positively impact terrorist incidents. In countries with larger populations, the terrorist group has more targets, can gain support from alienated members of the population, and the government has a difficult time with policing (Eyerman, 1998; Li, 2004). Many of the theories regarding the influence of wealth on terrorism focus on the qualities of the home country in generating support for terrorism (Krueger and Maleckova, 2002). While terrorists do need support within the target country, the “breeding ground” argument of poverty is likely to play a smaller role in the target country. For the target country, wealth may also play an important role in increasing the payoffs from terrorism and allowing for a more diverse target pool. Regardless of the mechanism at play, wealth should increase

\textsuperscript{20}Thank you to Will Moore for pointing out the group interdependence. 
\textsuperscript{21}Data for 1993 is missing from GTD and is not included here. 
\textsuperscript{22}International Terrorism: Attributes of Terrorism (ITERATE) dataset is commonly used for transnational attacks. Please see (Mickolus et al, 1986), (Mickolus et al, 1993), and (Mickolus et al, 2002) for more information.
the likelihood of terrorism. The theoretical expectations are contradictory in the literature for the impact of democracy (Eubank and Weinberg, 1994; Sandler, 1995; Eyerman, 1998; Li, 2004). Democracies may lower terrorist attacks because they provide alternative, non-violent means to expressing and resolving their grievances. While support is still needed in target countries, this effect should be largest when thinking about generating support for the terrorist group and the qualities of the home country. Increased democracy makes terrorism easier and less costly by providing political rights and civil liberties. This effect should be larger for the target country.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>(Std. Err.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>size</td>
<td>1.558</td>
<td>(0.283)**</td>
</tr>
<tr>
<td>club goods</td>
<td>-0.019</td>
<td>(0.917)</td>
</tr>
<tr>
<td>log home country gdp per capita</td>
<td>-0.455</td>
<td>(0.237)*</td>
</tr>
<tr>
<td>home country population</td>
<td>-7.321</td>
<td>(1.695)**</td>
</tr>
<tr>
<td>home country democracy</td>
<td>0.166</td>
<td>(0.158)</td>
</tr>
<tr>
<td>home country democracy²</td>
<td>-0.011</td>
<td>(0.008)</td>
</tr>
<tr>
<td>target country population</td>
<td>8.260</td>
<td>(1.817)**</td>
</tr>
<tr>
<td>log target country gdp per capita</td>
<td>0.795</td>
<td>(0.158)**</td>
</tr>
<tr>
<td>target country democracy</td>
<td>0.197</td>
<td>(0.031)**</td>
</tr>
<tr>
<td>Intercept</td>
<td>-7.474</td>
<td>(1.809)**</td>
</tr>
<tr>
<td>ln alpha</td>
<td>6.332</td>
<td>(0.076)</td>
</tr>
</tbody>
</table>

* Significant at the 10% level; ** Significant at the 5% level

The results in Table 2 show that once size is taken into account, club goods have no impact on the expected count of attack. Although my model predicted a negative effect for club goods, this null effect highlights the importance of future work in incorporating the likelihood of defection on resource efficacy. As expected, size positively impacts the expected count of attacks. An increase in population and gdp per capita of the home country decreases the expected count of terrorist attacks. Poor countries are more launch more terrorist attacks. As with the model on size, the negative and significant impacts of population highlights the need for future work to model the relationship between terrorist group size, club goods, public goods, counter-terrorism, and overall population size. Similarly to the previous model, the
democracy level of the home country has no impact on the expected count of attacks. The results for the target country are as expected for population and gdp per capita. The positive and significant coefficient on democracy for the target country highlights the importance of separating causal mechanisms for the home and target country. For the target country, freedom of movement appears to be the driving factor.

4 Conclusion

This paper finds that terrorist organizations will invest in social services only when it is in their benefit to do so. Only if the marginal utility gained from providing club goods is greater than the marginal benefit of increasing the likelihood of success of terrorist attacks by providing additional military resources will the terrorist organization will invest in social services. This finding is important because it questions whether militant terrorist groups truly have different goals from more politically oriented terrorist groups. The tactics of the two groups are different but this difference arises from the marginal benefits of using either militant resources or providing social services. If these conditions change, the terrorist group will act differently. For example, if a government provides the social services needed by the supporters of a terrorist organization which focuses on providing social services, this terrorist organization may switch and begin spending its resources on militant activity. Similarly, in answer to the question of how counter-terrorism affects terrorist activities, this paper finds that terrorist organizations may decrease their militant activities following an increase in counter-terrorism because it benefits the terrorist to do so. The terrorist group instead increases its social services because this leads to an increase in support. Thus, the terrorist organization may appear as a moderate or as a weakened group when the group is instead increasing its strength for the long run. Future research should investigate whether a decline in terrorist militant activity is the result of decreased strength or instead the result of a switch to social services provision.
5 Appendix

Impact of increase in military resources: Case 1 and 2

(1a) $\alpha \frac{\partial h}{\partial m} < \frac{\partial \psi}{\partial m} [v_f - v_s]$, then $\frac{\partial \hat{\sigma}}{\partial m} < 0$. This means that an increase in $m$ increases support for the terrorist organization because the indifference threshold is lowered. I call this case “High Success”.

(2a) $\alpha \frac{\partial h}{\partial m} > \frac{\partial \psi}{\partial m} [v_f - v_s]$, then $\frac{\partial \hat{\sigma}}{\partial m} > 0$. This means that an increase in $m$ decreases support for the terrorist organization because the indifference threshold is raised. I call this case “Low Success”.

Impact of increase in counterterrorism strategy: Case 1 and 2

(1b) If $-\frac{\partial \psi}{\partial c} [v_f - v_s] < (1 - \gamma) \frac{\partial \tau}{\partial c}$, then $\frac{\partial \hat{\sigma}}{\partial c} < 0$. This means that an increase in $c$ increases support for the terrorist organization because the indifference threshold is lowered. I call this case “High Damage”.

(2b) If $-\frac{\partial \psi}{\partial c} [v_f - v_s] > (1 - \gamma) \frac{\partial \tau}{\partial c}$, then $\frac{\partial \hat{\sigma}}{\partial c} > 0$. This means that an increase in $c$ decreases support for the terrorist organization because the indifference threshold is raised. I call this case “Low Damage”.

Given the possible impacts of an increase in military expenditures by the terrorist organization and counter-terrorism by the government, 4 cases arise:

1. $\frac{\partial \hat{\sigma}}{\partial m} > 0$, $\frac{\partial \hat{\sigma}}{\partial c} > 0$
2. $\frac{\partial \hat{\sigma}}{\partial m} > 0$, $\frac{\partial \hat{\sigma}}{\partial c} < 0$
3. $\frac{\partial \hat{\sigma}}{\partial m} < 0$, $\frac{\partial \hat{\sigma}}{\partial c} > 0$
4. $\frac{\partial \hat{\sigma}}{\partial m} < 0$, $\frac{\partial \hat{\sigma}}{\partial c} < 0$
Second Order Conditions

In order for a Nash equilibrium to exist, both the utility function of the government and terrorist must be concave. The SOC of the terrorist utility function must be taken to ensure this. However since this condition is dependent on the signs of the SOC from the potential supporter’s utility function I will show these conditions here. The associated second order conditions are as follows:

\[
\frac{\partial \hat{\sigma}}{\partial m} = \frac{1}{2} \alpha \frac{\partial h}{\partial m} - \frac{1}{2} \frac{\partial \psi}{\partial m} [v_f - v_s] \quad (15)
\]

\[
\frac{\partial^2 \hat{\sigma}}{\partial m^2} = -\frac{1}{2} \left[ \alpha^2 \frac{\partial^2 h}{\partial m^2} + \frac{\partial^2 \psi}{\partial m^2} [v_f - v_s] \right] > 0 \quad (16)
\]

Since \( h'' < 0, \psi'' > 0, v_f - v_s < 0 \), we know this expression is positive.

\[
\frac{\partial \hat{\sigma}}{\partial c} = -\frac{1}{2} \frac{\partial \psi}{\partial c} [v_f - v_c] - \frac{1}{2} \tau' \quad (17)
\]

\[
\frac{\partial^2 \hat{\sigma}}{\partial c^2} = -\frac{1}{2} \frac{\partial^2 \psi}{\partial c^2} [v_f - v_c] + \tau'' < 0 \quad (18)
\]

\[
\frac{\partial^2 \hat{\sigma}}{\partial c \partial m} = -\frac{1}{2} \frac{\partial^2 \psi}{\partial c \partial m} [v_f - v_s] > 0 \quad (19)
\]
Given these SOC I can now check the SOC for the terrorist organization. This is:

\[
\frac{\partial^2 U^T}{\partial m^2} = -\frac{\partial^2 \psi}{\partial m^2} S + \alpha^2 \frac{\partial \mu}{\partial g^2} + \alpha \frac{\partial^2 \mu}{\partial g \partial p} \frac{\partial \hat{\sigma}}{\partial m} + \frac{\partial^2 \mu}{\partial p^2} \left( \frac{\partial \hat{\sigma}}{\partial m} \right)^2 - \frac{\partial \mu}{\partial p} \frac{\partial^2 \hat{\sigma}}{\partial p \partial m^2} \tag{20}
\]

We know that \( \frac{\partial^2 \psi}{\partial m^2} > 0 \), thus the first term is always negative, \( \frac{\partial^2 \mu}{\partial g^2} < 0 \), making the second term negative, \( \frac{\partial^2 \mu}{\partial p^2} < 0 \), thus the fourth term is always negative, \( \frac{\partial^2 \hat{\sigma}}{\partial m^2} \) is positive and \( \frac{\partial \mu}{\partial p} > 0 \), so the fifth term is always negative. Therefore the concavity of this function depends on the third term which depends on the sign of \( \frac{\partial \hat{\sigma}}{\partial m} \). If this term is negative, as we might expect when the terrorist organization cannot easily target potential supporters, the third term is always negative and the function is always concave. If this term is positive, as we would expect it to be when the terrorist organization has a concentrated group of potential supporters, the SOC holds if the sum of the other 4 terms is greater than this term. Therefore when \( \frac{\partial \hat{\sigma}}{\partial m} > 0 \) and \( 2\alpha \frac{\partial^2 \mu}{\partial g \partial p} \frac{\partial \hat{\sigma}}{\partial m} \) is positive and \( \frac{\partial \hat{\sigma}}{\partial c} \) is positive, this function is convex and the existence of a Nash Equilibrium is not guaranteed. In the cases mentioned previously, cases 3 and 4 are guaranteed to have a NE and cases 1 and 2 have one if the above inequality does not hold.

**Equation 11**

We can also take the first partial with respect to \( c \) to find out if the welfare for the terrorist is increasing or decreasing in \( c \) (it will depend on the sign of \( \frac{\partial \hat{\sigma}}{\partial c} \))

\[
\frac{\partial U^T}{\partial c} = -\frac{\partial \psi}{\partial c} S - \frac{\partial \mu}{\partial p} \frac{\partial \hat{\sigma}}{\partial c} \tag{21}
\]

We know that \( \frac{\partial \psi}{\partial c} \) is positive and hence the first term is negative. We also know that \( \frac{\partial \mu}{\partial p} \) is positive and hence if \( \frac{\partial \hat{\sigma}}{\partial c} \) is positive the second term is negative and hence \( \frac{\partial U^T}{\partial c} \) is negative meaning that the terrorists’ welfare is decreasing as counter-terrorism is increased (in this case the government is able to recruit potential supporters). If on the other hand \( \frac{\partial \hat{\sigma}}{\partial c} \) is
negative then the second term is positive. If the utility gained from increasing supporters and the government losing them is greater than the decrease in the terrorists’ chance at success then the terrorists’ welfare is increasing as \( c \) increases.

**Equation 12**

\[
\frac{\partial m}{\partial c} = \frac{\frac{\partial^2 \psi}{\partial m \partial c} S - \alpha \frac{\partial^2 \mu}{\partial g \partial p} \frac{\partial \hat{\sigma}}{\partial c} - \frac{\partial^2 \mu}{\partial p^2} \frac{\partial \hat{\sigma}}{\partial m} + \frac{\partial \mu}{\partial g} \frac{\partial^2 \hat{\sigma}}{\partial m \partial c}}{-\frac{\partial^2 \psi}{\partial m^2} S + \alpha^2 \frac{\partial \mu}{\partial g^2} + \alpha \frac{\partial^2 \mu}{\partial g \partial p} \frac{\partial \hat{\sigma}}{\partial m} + \frac{\partial^2 \mu}{\partial p^2} (\frac{\partial \hat{\sigma}}{\partial m})^2 - \frac{\partial \mu}{\partial p} \frac{\partial^2 \hat{\sigma}}{\partial m \partial c}}
\]  

(22)

Once again the sign of this differentiation depends on which case we are in. We know the denominator is always negative whenever \( \frac{\partial \hat{\sigma}}{\partial m} \) is negative. Therefore in cases 3 and 4 the terrorist’s response depends on the sign of the numerator. Since \( \frac{\partial^2 \psi}{\partial m \partial c} > 0 \) the first term is always positive. Since \( \frac{\partial^2 \hat{\sigma}}{\partial m \partial c} > 0 \) we know the fourth term is always positive. If \( \frac{\partial \hat{\sigma}}{\partial c} < 0 \) then the second term is positive. This means that if an increase in counterterrorism policies leads to an increase in mobilization for the terrorist group, the terrorist group becomes more likely to decrease its best response in return to an increase in counter-terrorism. If \( \frac{\partial \hat{\sigma}}{\partial c} > 0 \) then the best response curve is still negative assuming that the sum of all three others (given that the third is positive) is greater than this term. The third component is positive when \( \frac{\partial \hat{\sigma}}{\partial c} \) and \( \frac{\partial \hat{\sigma}}{\partial m} \) are of different signs. If the other three outweigh this term when it is negative, the best response curve is still negative. If the second and third term are negative and greater than the other two terms (thus causing the best response curve to be positively sloping, then the terrorist group should increase military actions in response to an increase in counter-terrorism. These cases are shown below.

1. \( \frac{\partial \hat{\sigma}}{\partial m} > 0; \frac{\partial \hat{\sigma}}{\partial c} > 0 \). If we are in case 1 we know the denominator can be negative or positive. If we assume the SOC holds and the denominator is negative (therefore that

\[
2\alpha \frac{\partial^2 \mu}{\partial g \partial p} \frac{\partial \hat{\sigma}}{\partial m} < \frac{\partial^2 \psi}{\partial m^2} S - \alpha^2 \frac{\partial^2 \mu}{\partial g^2} \frac{\partial \hat{\sigma}}{\partial m} (\frac{\partial \hat{\sigma}}{\partial m})^2 + \frac{\partial \mu}{\partial g} \frac{\partial \mu}{\partial p} \frac{\partial^2 \hat{\sigma}}{\partial m \partial c}
\]  

then \( \frac{\partial m}{\partial c} \) is negative when \( \alpha \frac{\partial^2 \mu}{\partial g \partial p} \frac{\partial \hat{\sigma}}{\partial c} + \frac{\partial^2 \mu}{\partial p^2} \frac{\partial \hat{\sigma}}{\partial c} \frac{\partial \hat{\sigma}}{\partial m} < \frac{\partial^2 \psi}{\partial m \partial c} S + \frac{\partial \mu}{\partial p} \frac{\partial^2 \hat{\sigma}}{\partial m \partial c} \).
2. $\frac{\partial \hat{\sigma}}{\partial m} > 0, \frac{\partial \hat{\sigma}}{\partial c} < 0$. If we are in case 2 we know the denominator can be negative or positive. If we assume the SOC holds then $\frac{\partial m}{\partial c}$ is negative. When the SOC does not hold $\frac{\partial m}{\partial c}$ is positive.

3. $\frac{\partial \hat{\sigma}}{\partial m} < 0, \frac{\partial \hat{\sigma}}{\partial c} > 0$. If we are in case 3, we know the SOC holds and therefore that the denominator is negative. Therefore $\frac{\partial m}{\partial c}$ is negative when $\alpha \frac{\partial^2 \mu}{\partial g \partial p} \frac{\partial \hat{\sigma}}{\partial c} < - \frac{\partial^2 \mu}{\partial p^2} \frac{\partial \hat{\sigma}}{\partial m} + \frac{\partial \psi}{\partial m \partial c} S + \frac{\partial \mu}{\partial p} \frac{\partial^2 \hat{\sigma}}{\partial m \partial c}$ and is positive when this inequality does not hold.

4. $\frac{\partial \hat{\sigma}}{\partial m} < 0, \frac{\partial \hat{\sigma}}{\partial c} < 0$. If we are in case 4 we know the SOC holds and therefore that the denominator is negative. Therefore $\frac{\partial m}{\partial c}$ is negative when $\frac{\partial^2 \mu}{\partial p^2} \frac{\partial \hat{\sigma}}{\partial c} \frac{\partial \hat{\sigma}}{\partial m} < \frac{\partial \psi}{\partial m \partial c} S + \alpha \frac{\partial^2 \mu}{\partial g \partial p} \frac{\partial \hat{\sigma}}{\partial c} + \frac{\partial \mu}{\partial p} \frac{\partial^2 \hat{\sigma}}{\partial m \partial c}$ and is positive when this inequality does not hold.

$$\frac{\partial^2 U^G}{\partial c^2} = \frac{\partial^2 \psi}{\partial c^2} + \delta \frac{\partial^2 \hat{\sigma}}{\partial c^2} - k''$$  

We know that $\frac{\partial^2 \psi}{\partial c^2} < 0, k'' > 0$ so therefore the SOC is $< 0$ when $\frac{\partial^2 \hat{\sigma}}{\partial c^2} < 0$, which was assumed.

**Equation 17**

Now that we know the FOC and SOC, we need to use implicit differentiation to figure out how the government will respond to the terrorist’s actions.

$$\frac{\partial c}{\partial m} = -\frac{\frac{\partial^2 \psi}{\partial c \partial m} + \delta \frac{\partial^2 \hat{\sigma}}{\partial c \partial m}}{\frac{\partial^2 \psi}{\partial c^2} + \delta \frac{\partial^2 \hat{\sigma}}{\partial c^2} - \frac{\partial^2 \mu}{\partial m^2}}$$

This is positive because $\frac{\partial^2 \psi}{\partial c \partial m} > 0$ and $\frac{\partial^2 \hat{\sigma}}{\partial c \partial m} > 0$ and from the SOC we know that the denominator is also negative.
Equation 18

In terms of the government’s behavior, we also need to know whether the utility of the government is increasing or decreasing in the terrorists level of attacks:

\[
\frac{\partial U^G}{\partial m} = \frac{\partial \psi}{\partial m} + \delta \frac{\partial \hat{\sigma}}{\partial m}
\]  

(25)

From this we see that when \( \frac{\partial \hat{\sigma}}{\partial m} < 0 \) then \( \frac{\partial U^G}{\partial m} < 0 \). However when \( -\frac{\partial \psi}{\partial m} > \delta n \frac{\partial \hat{\sigma}}{\partial m} \) then \( \frac{\partial U^G}{\partial m} < 0 \) and when \( -\frac{\partial \psi}{\partial m} < \delta \frac{\partial \hat{\sigma}}{\partial m} \), then \( \frac{\partial U^G}{\partial m} > 0 \).
References


B’Tselem. 2011. URL: http://www.btselem.org


URL: [http://www.humanrightsdata.org](http://www.humanrightsdata.org)


Database, Global Terrorism. 2011. “START.”. 
URL: [http://www.start.umd.edu/gtd/](http://www.start.umd.edu/gtd/)


URL: [http://www.pcpsr.org (access date December, 2010)](http://www.pcpsr.org)

URL: Retrieved January, 11, 2011, from the Political Terror Scale Web site: 
http://www.politicalterrorscale.org/


URL: http://dx.doi.org/10.1017/S777777770200002X


Media, Jerusalem and Communication Centre. 2010. “Palestinian opinion pulse.”. **URL:** [http://www.jmcc.org](http://www.jmcc.org) (access date December, 2010)


