Hard Targets:
Theory and Evidence on Suicide Attacks*

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Abstract: Who chooses suicide attacks? Using three data sources spanning a half-century, and comparing suicide attackers to civil war insurgents, we show that a) insurgents typically target poor, mountainous countries, while suicide attacks do not; b) though insurgents often kill coreligionists, they seldom use suicide attacks to do so; and c) though many groups rebel, suicide attacks are favored by the radical religious. Putting theology aside, we explain (a) and (b) with the notion of a "hard" target, predicting that suicide attacks are chosen when targets are hard to destroy without high risk of capture. Data from Israel/Palestine confirm that prediction. We draw on the sociology of religion to explain (c), modeling the choice of tactics by rebels when targets are hard, and bearing in mind the human costs and tactical benefits of suicide attacks. We ask what a suicide attacker would have to believe to be deemed rational. We then embed that attacker and other operatives in a club model which emphasizes the function of radical religious organizations as providers of benign local public goods. The sacrifices which these groups demand reduce free-riding in cooperative production of these goods. Sacrificial demands make these clubs well suited for organizing suicide attacks, a tactic for which defection by operatives endangers the entire organization. The model has testable implications for tactic choice and damage achieved by different types of rebels. Those implications are confirmed by data on terrorist attacks in the Middle East: Radical religious clubs choose suicide terrorism more often and are unusually effective at it. Our results suggest policies to counter suicide terrorism by religious radicals.
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Introduction

The suicide attack is a gruesome tactic of rebellion which necessitates, if the attack is successful, losing a loyal cadre. Why would leaders of rebellions employ it? Under what conditions will suicide attacks succeed? What kinds of rebels use it most effectively? Our answers are as follows. Where states are strong and their targets well-protected, rebel organizations cannot successfully use standard insurgency tactics. Yet under those conditions, suicide attacks can be devastatingly effective. While recruiting suicide attackers is easier than many surmise, recruiting operatives resistant to defection in these high-stakes attacks is a first-order tactical problem. Radical religious organizations that require sacrifices as signals of commitment, and in return provide concrete benefits, are better able to insulate themselves against defection.

Our argument draws on three literatures, the political science of insurgencies, the economics theory of clubs and the sociology of religion. In section 1 we use a newly constructed dataset (described in the Appendix) to present two patterns. First, though the environmental conditions favoring insurgency (Fearon and Laitin 2003) are poor countries with rough terrain, the use of suicide attacks is not predicted by either. Second, while rebels tend to attack coreligionists, suicide attacks tend to target members of other religions.

In section 2, we suggest the concept of "hard targets" as an explanation for both patterns. As targets are hardened (i.e., chances of escape are reduced) suicide attacks are increasingly favored because they allow even well-defended targets to be destroyed without apprehension. This is a critical concern for rebels in asymmetric conflicts since a strong state can use information from captured attackers to expose the network and arrest or kill its members. For hard enough targets this advantage outweighs the cost of losing a cadre (the attacker) with certainty. Thus as states become more powerful and better able to defend targets – the first pattern – suicide attacks are used more often. Coreligionists tend to look similar. Thus attackers of the same religion as targets are hard to distinguish by profiling, making victims soft targets because they are harder to defend; consequently -- now for the second pattern -- attackers can kill coreligionists without resorting to suicide attacks.

In section 3 we ask why religious radicals so often choose suicide attacks. Rather than the conventional explanation, which is based on theological motivation, our approach emphasizes the tactical difficulty of operating against hard targets. We model the choice of

tactics by rebels when targets can be either hard or soft and rebels are concerned about capture and defection. We first outline the beliefs that suicide attackers would need to hold for their actions to be deemed rational (Hamermesh and Soss, 1974; Elster, 2005; Becker and Posner, 2005; Wintrobe 2006). We then consider the attacker and his organization in a rational choice framework. The model, extending Iannaccone (1992) and Berman (2000, 2003), explains why hybrid "clubs" (which provide benign local public goods such as education and welfare) of a certain type (most easily formed through religious membership) are able to complete high-stakes suicide attacks despite strong incentives for operatives to defect.

In section 4 we test implications of that model using data on terrorism from Israel, Palestine and Lebanon. We find that hybrid clubs do in fact carry out suicide attacks more often and more effectively than do secular terrorists. Our evidence suggests that theological motivations are overrated. Among three radical religious organizations with very similar theologies about Jihadist conflict, those with active local public good provision (Hamas and Hezbollah) are much more effective suicide terrorists than that without (the Palestinian Islamic Jihad).

Section 5 discusses the implications of the model for protecting high value targets from radical religious clubs in a hard target environment. The better states and markets are at providing social services, the harder it is for insurgencies to organize around a social-service provision base and conduct high stakes attacks without fear of defection.

An additional section discusses how this approach might extend to Iraq, Sri Lanka and other cases, even if they do not conform precisely to our model. In conclusion we suggest future empirical extensions that follow from the theory.

Section 1. Background and Conjectures

Insurgency

Insurgency is a technology of rebellion through guerilla warfare that has been successful in challenging regime domination in many countries. It has been hitched to various ideologies: communism, nationalism, religious fanaticism, and even to no ideology at all (the FARC in Colombia)! Between1945 and 1999, 127 civil wars in 73 different countries accounted for more than sixteen million deaths.[1] Many of these relied upon the technology of rural insurgency.

Fearon and Laitin (2003, hereafter FL) show that civil wars cannot be explained by: (a) level of grievances in the society or (b) degree of ethnic or religious difference or any form of civilizational clash. Rather, the best predictors of civil war are conditions favoring the success of the rural insurgency technology: bad roads, rough terrain, poor state armies, lack of more remunerative employment for young men (as compared to being an insurgent), and weak or new governments.[2]

This research yields an insurgent profile. He is poor (with few alternative career paths than insurgency), from an impoverished country (but not necessarily a backward region of that country, as internal migration from a poor to a rich region is an attractive alternative to insurgency). This country is likely to have a considerable swath of rough terrain not easily accessible by the armed forces of the state. Rough terrain is important for insurgency survival in part because of the inherent difficulty of the terrain, but is magnified in low GDP/capita countries, as GDP/capita is a good proxy for a weak state with a badly organized, low information army, an army that would not perform well under harsh conditions. Armies in poor states, for lack of reliable information, rely heavily on indiscriminate bombing that has the unintended effect of enriching the pool of potential recruits, thereby helping to sustain the insurgency. Recruits are typically young men,

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[1] . Civil war is a violent conflict between an organized militia and the armies of a state, involving contest for control over a region or the entire territory of the state. Enumeration requires at least 1,000 deaths recorded as a direct result, concentrated temporally close to its onset, with at least 10 percent of the deaths being civilians or soldiers on the government's side. For details see Fearon and Laitin (2003).

[2] . FL rely on two datasets: a revised MAR group/country dataset of over 400 minority/ethnic/religious/regional groups in over 100 countries; and a country/year data set of all countries of over 500,000 population in every year since 1945. Replication data are available at http://www.stanford.edu/group/ethnic/workingpapers/papers.htm].

unemployed, ill-educated, and therefore only remotely involved in grasping the ideological message of leadership.[3]

Suicide Attacks as a Tactic

Guerrilla warfare by insurgents encompasses a variety of tactics – most typically a network of self-sustaining rural militias that first intimidate populations and then govern them, providing alternate sovereignty. Suicide attacks –in which the attacker will almost certainly die if the attack succeeds – are here interpreted as a tactic of rebellion distinct from typical insurgency tactics – in which the attacker has at least some chance of survival. For example, we see Al-Qa'ida as (in large part) a violent movement to overthrow the Saudi monarchy and secular nationalist governments in Muslim countries, but not one relying on insurgency. Its suicide attacks in Tanzania, Kenya, Bali and the US were organized not to overthrow those governments, but rather to recruit support for movements that would challenge regimes (such as the Saudi) not based on their interpretation of Islam. The Al-Qaeda attacks on the US in September 2001 also sought in large part to reduce American military support for the Saudi regime. This perspective interprets Hamas and other Palestinian rebels as engaged in a rebellion with two goals: to establish sovereignty in part (or all) of what is today Israel and her occupied territories and additionally to control the government of an eventual Palestinian state.

[Table 1 about here]

Although an ancient tactic in inter-state warfare, suicide attacks are relatively rare. They were not used as a modern tactic of internal rebellion until 1982 when Hizbullah launched suicide attacks to challenge the Israeli occupation of South Lebanon.[4] The Liberation Tigers of Tamil Eelam (LTTE) in Sri Lanka followed suit with the second major series of suicide attacks taking place beginning in 1987 (combined with conventional insurgency tactics). Suicide attacks have been employed (at least twice) in civil wars in only five of the sixty-nine countries facing insurgencies in the last half of the 20th century. Table 1 lists those five countries, and the four with only a single recorded suicide attack. Data for Table 1 are drawn by combining three sources, two datasets compiled by Robert Pape and a

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[3] . This is a caricature of the typical insurgent. See Weinstein (2006) who shows that in some civil wars, insurgents are ideologically in touch with leader goals.

[4]. A suicide attacker of unknown origin attacked the Iraqi embassy in Beirut in 1981 for unknown reasons.

third from the International Policy Institute for Counter-Terrorism in Herzliya. The Appendix describes the sources and how we combined them.

Why are suicide attacks so rarely used by rebels? It is best to start with a profile of a suicide bomber as culled from the literature. He or she appears to be quite distinct from the typical recruit in a rural insurgency.[5] The suicide bomber is more upscale economically, and more highly educated on average. (We surmise from this that he or she knows and relates to the ideological message of leadership, making grievances more consequential as a motivating force).[6] The country of his victim is typically richer, and along with its wealth it has a competent army. Unlike the hopeless economic conditions that are ideal for insurgency, suicide bombers have moderate employment opportunities outside of the rebellion. The country's terrain is more easily accessed by the state. The list of countries sending suicide attackers in the 20th century, as reported in Table 1, is consistent with the idea that suicide attackers come from places where the government and military are well organized to suppress insurgency: Israel, Sri Lanka, Lebanon, Turkey and Saudi Arabia.

Table 1 also illustrates that the increase in suicide attacks since 1999 is associated with rebels choosing suicide attacks over other tactics. In the first four years of this century 196 suicide attacks were reported, an increase of almost one third over the entire second half of the 20th century. While the increase in fatalities is mostly due to the attacks of 9/11, the increased incidence of suicide attacks is almost entirely due to three rebellions against well-organized, well-funded militaries: the second Palestinian Intifada against the Israeli occupation, the Iraqi insurgency against Coalition forces, and the Chechen rebellion against Russia.

Comparing existing research on insurgencies with that on suicide attacks suggests a conjecture:

C1: When conditions favor insurgency suicide terrorism decreases in value; where insurgency is disfavored, leaders need alternate means to succeed, and without a guerrilla

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[5] . Krueger and Maleckova (2002). While the jury is still out on whether suicide attackers are more upscale than the average person in their society, we can be more confident in claiming that he or she is more highly educated than the typical member of a rural insurgency.

[6] . Insurgents are most likely to be male; suicide bombers draw from both genders.

force as a real threat, rebels seek through spectacular heroic events demonstrating their
tactical prowess and their commitment to the cause to gain advantage over a ruling regime.

The intuition is straightforward.[7] Suicide bombing is a costly tactic, as it strips the insurgent organization of cadres whose motivation and commitment would have made them valuable in other roles. Moreover, an organization with political aspirations must explain the loss of a son or daughter to the family and community. If sustaining the insurgency were easy, such wasteful losses would be avoided.[8]

To test our conjecture that conditions which favor suicide attacks differ from those that favor insurgency we combined the FL dataset on civil wars with the data described above on suicide attacks, aggregating the latter into country-year observations. That coding requires a decision on how to treat international terrorism. All insurgencies and 91 percent of suicide attacks in our samples take place in the country of the attacker (counting Israel and Palestine as the same place). In the 9 percent of cases in which attackers are foreign, including the attacks of 9/11/2001, we must decide whether the relevant conditions are those of the country of the attacker, the country of the attack, or the country of the target. Since we are interested in the decision between a domestic insurgency tactic and a suicide attack, we code the attack by the country of the perpetrators' organization.[9] With this assumption, we can compare the predictors of civil war onsets with those of suicide attacks, across countries.

[Table 2 about here]

Table 2 examines whether predictors of insurgencies also predict suicide attacks. Our measure of insurgency is the one commonly used in the literature, the onset of civil wars. The first two columns reproduce findings familiar from the economics and civil war literature (Fearon and Laitin, 2003; Collier and Hoeffler, 2001). A cross sectional linear probability regression of a civil war onset indicator on GDP/capita and the estimated proportion of mountainous terrain yields a negative coefficient on GDP/capita and a positive

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[7] . Wintrobe (2006) offers a similar conjecture in discussing the demand side for terror, that is, why leaders would ask for such sacrifices among their closest followers.

[8] . This reasoning is consistent with the non-use of *kamikaze* pilots by the Japanese military until American targets were too hard for conventional warfare (Rosenthal, 2003).

[9] The motives of suicide attackers are complex, variable among attackers, and difficult to verify; yet we hold it reasonable to assume that at least part of their motive is to challenge the perpetrators' "home" government, even when the targets are external. For instance, even if Al-Qaeda wishes to influence the American government, whose civilians it targets, it vehemently opposes the support that the United States provides the Saudi government.

coefficient on mountains. Doubling GDP/capita predicts a probability of suffering a civil war 8-10 percentage points lower. Doubling the proportion of mountainous regions lowers the probability of a new civil war by about 0.44 percentage points, about one quarter of the mean. These regressions have potential issues of endogeneity bias that are discussed in the literature. They are reported here only for comparison.

The next two columns, in contrast, show that GDP/capita predicts a small and statistically insignificant change in the number of annual suicide attacks between countries. Mountainous terrain does not predict suicide attacks either, though it does predict civil wars. Taken together, the regression results indicate that *the predictors of civil wars do not predict suicide attacks*: poor, mountainous countries are likely to suffer insurgencies which result in civil wars, but there is no evidence that they are more likely to suffer suicide attacks than richer, flatter countries.

The *difficulty* of conducting an insurgency is likely a condition favoring the use of a costly tactic such as suicide attacks. This helps explain Israel, which has suffered most acutely from 146 such attacks during the sample period. Israel is a developed, relatively flat, small country with a brilliantly equipped army that has invested heavily in information. The conditions for insurgency in Israel, given the FL model, are not propitious. Standard rural guerrilla tactics are unlikely to succeed, making suicide attacks a relatively effective tactic.

C1, focusing on conditions unfavorable for insurgency as an incentive to employ suicide bombing, conditional on there being a rebel movement, has some interesting exceptions. There are cases where insurgency is disfavored, yet rebel groups have nonetheless emerged which do not employ suicide attacks. These cases include South Africa (the ANC), Spain's Basque Country (ETA), Japan (Aum Shinrikyo), Italy (Red Brigades), and Germany (Baader Meinhof). They suggest a second conjecture.

C2: Where conditions do not favor insurgency, suicide attacks remain extraordinarily difficult to sustain. The conditions that help sustain suicide attacks remain to be specified, but religious difference between the perpetrators and the victims helps to fulfill at least one of these conditions.

As with the case of the *kamikaze* pilots (Shinto pilots and largely Christian victims), the suicide attackers in our dataset most often targeted victims of other religions. In Israel (Muslims vs. Jews), Sri Lanka (Hindus vs. Buddhists), Russia (Muslims vs. Eastern

Orthodox Christians), and China (Muslims vs. Buddhists), religious difference marked perpetrator from victim. In the nine cases perpetrated by Saudis, although the forces of Al-Qaeda seek to overthrow their coreligionists, their suicide attacks typically targeted Christians. In Egypt, the suicide attack was by Muslim fundamentalists against the secular Muslims housed in the Egyptian embassy in Pakistan. While this does not support the conjecture, the argument about the importance of religion is not clearly undermined. Only the fourteen cases perpetrated by the PKK (the Kurds) in Turkey are clearly disconfirming. But overall, 89.9 percent of the suicide attacks were aimed at victims whose religion was different from the attackers'. Table 3 presents data confirming this pattern.

[Table 3 about here]

In contrast to suicide attacks, most insurgencies pit coreligionists against each other. Table 3 reports that in the FL data only 18.4 percent of civil wars were fought between rebels predominantly from one religious group against armies of a state who were largely of a different religious group. In three of these cases, suicide attacks were used: Sri Lanka, Russia (Chechnya), and China (Xinjiang). Cases such as Nagorno-Karabakh in Azerbaijan, Srpska Republic in Bosnia, and rebellions in Nigeria, Philippines, Sudan, Cyprus and Bangladesh all pitted guerrilla armies against states that were led by people of a different religion. In these cases, however, conditions favoring insurgency were better, lessening the need for the extreme tactic of suicide attacks. Only the IRA in Northern Ireland is an example of low probability of insurgency along with religious difference, yet no suicide attacks. (This is the only modern case that meets the conditions of $C1$ and $C2$, yet has no suicide attacks).

Taken together, the evidence in Tables 1, 2 and 3 shows that insurgencies are predicted by very different factors than are suicide attacks. Insurgents tend to operate in poor, mountainous regions and against coreligionists. Suicide attackers tend to come from countries that are not particularly poor or mountainous and they tend to attack members of other religions. While much has been made of the radical Islamic aspect of suicide terrorism, the greatest wave of suicide attacks in the 20th century was by (nominally atheistic) neo-Marxist Tamil separatists against the Hindu Sri Lankans. Yet even putting aside radical Islam, the evidence of religious difference in suicide attacks in Table 3 is extremely strong and requires some explanation. In the next section we offer a single tactical explanation for the patterns in Tables 1, 2, and 3 which is much more mundane than the grand theme of

civilizational conflict. In section three we return to a discussion of radical religious groups and their role in suicide attacks.

Section 2. Hard Targets and Coreligionists

Why do some environments produce conventional insurgencies while others produce suicide attacks? Before constructing a behavioral model we offer the simplest explanation we can think of. Hamas, the LTTE and other terrorist organizations that use suicide attacks against civilians of other religions often kill collaborators and political rivals. Yet they never expend the life of a cadre to do so. Perhaps the choice has to do with the nature of the target.

Think of coreligionists as soft targets. The typical problem in defending ("hardening") a crowded target is the infeasibility of screening all individuals with access to the target for every possible weapon. One solution is to predict which individuals are at highest risk of harboring violent intentions ("profiling") and then screen them carefully. Yet coreligionists are typically similar in appearance, making profiling attackers extremely difficult. [10] When profiling is hard a terrorist can often walk up to a civilian victim, shoot him and escape into the crowd, as the gentleman Wilkes-Booth did to President Lincoln.

Besides profiling attackers, another way to make targets hard is to invest resources in their protection, such as inspections at airports, security guards, and the surveillance of probable threats. In the few prominent cases of suicide attacks on coreligionists, targets are well-defended by means beyond profiling. That would be the case in the assassination of Egyptian President Anwar Sadat by the Egyptian Islamic Jihad, which was essentially suicidal, or in the assassination of Northern Alliance leader Ahmad Shah Masood by Al–Qaeda suicide bombers disguised as journalists (Rashid 2002, p. 87). In both cases the attackers overcame any theological objections to killing Muslims, but may have chosen the suicide tactic because a conventional attack on those targets implied almost certain apprehension or death. Similarly with the LTTE assassination of Rajiv Gandhi on May 21, 1991, in which a Hindu killed a Hindu. As the favorite to win election as Prime Minister of India, he was an extraordinarily well-defended target.

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[10] . This might explain the anomaly of Northern Ireland discussed in section 1, where suicide attacks are *not* used, even against members of the other religion. Diego Gambetta (personal communication, October 21, 2003) reports on research showing the strategic mimicking of identities so that potential targets of terror avoid identification as either Protestant or Catholic. These strategies make profiling more difficult.

The notion of hard targets can also explain the patterns in Table 2. Countries with high income per capita have governments with sufficient resources to protect military targets against attack by standard insurgency tactics, thus preventing a conventional insurgency from succeeding. This Hobbesian argument is offered by Fearon and Laitin (2003) with regard to military targets but it can apply to civilian targets as well. While civilians are harder to defend, well-funded military and police forces which control their own territory will be capable of eventually finding, capturing and interrogating the attackers. Under interrogation captured cadres will generally reveal information about the insurgency, further undermining the organization. Mountainous terrain, then, is important because it is so difficult for even a strong government to control, allowing rebels attackers a refuge even if their identities are known. Rebels opposing poorly funded governments or working out of mountainous areas are more likely to attempt an insurgency, then, but no more likely to resort to suicide attacks.

The choice of methods by Iraqi insurgents after the occupation is consistent with the "hard target" approach. Suicide attacks are generally directed against Coalition forces or well-defended Iraqi targets. Softer targets such as oil pipelines, which are extremely difficult to protect, do not merit suicide attacks.

This discussion suggests a refined conjecture.

C3: Suicide attacks are reserved for targets which are well enough defended that their destruction is unlikely using conventional means.

That conjecture can be tested on data available from Israel and Palestine. Palestinian insurgents in the West Bank and Gaza have an extensive choice of soft targets. Settlers and soldiers use roads that pass through heavily populated areas or through terrain that make them vulnerable to ambush. Settlements and military locations are also quite exposed and often in proximity to large Palestinian populations. The result is that an attacker can fire a weapon or detonate a bomb remotely, flee relatively easily, and then blend into the local population. In contrast, targets on the Israeli side of the "green" line are much "harder," posing much greater risks for the attacker. To reach the target the attacker must negotiate checkpoints and perhaps a security fence at where his weapon could be discovered. Once on the Israeli side, security forces and civilians can profile the attacker based on a "reading" of

his ethnic markers. After an attack the attacker faces a heightened version of all those risks on the way back to safety.

[Table 4 about here]

Applying our conjecture to the Israeli case, we predict that attacks within the green line are more likely to use suicide tactics. Table 4 reports data on attacks and fatalities by location and method for the period from the beginning of the second *intifada* (September 2000) through July 2003. Attacks include all forms of violence toward Israelis and residents of Israel as recorded by the IDF, including suicide attacks but also shootings, roadside bombs, stone throwing and other tactics. The vast majority of recorded attacks are against soft targets in the West Bank and Gaza (96%). The next column records fatalities due to attacks, which indicates that the majority of fatalities (60%) are on the Israeli side of the green line. While there is no direct information here about choice of methods, the methods used on the Israeli side of the green line are clearly deadlier.

Conditional on fatalities, one can compare method by location. Suicide attacks killed eight people in the West Bank and Gaza while killing 401 on the Israeli side of the green line. That is to say, 17,405 attacks in the West Bank and Gaza resulted in eight deaths due to suicide attacks while 730 attacks on the Israeli side of the green line resulted in 401 deaths due to suicide attacks. The data show that suicide attacks are disproportionately used against the relatively "hard" targets on the Israeli side of the green line.

The notion of a hard target provides a clear explanation for why suicide terrorism is not the tactic of choice for a typical insurgent operating in a poor hilly country against people who look like him: guerrilla leaders have lethal options which do not require the certain death of loyal cadres. Rebel leaders facing harder targets are much more likely to turn to suicide terrorism. High income countries and their allies provide hard targets. We now build a framework for examining the tactical choices of organizations which operate in a hard target environment.

Section 3. Rational Martyrs and Terrorist Clubs: A Framework

The conjectures offered above and the evidence supporting them are provocative. Yet they have as yet little theoretical foundation. While one could easily hypothesize that attackers believe suicide attacks ensure eternal grace, a reward that would not come from killing coreligionists, one would face the challenge of explaining the extraordinary degree of religious conviviality in the world when such great rewards are available for killing one's neighbor (albeit of a different religion). To be sure, careful work in the social sciences, most notably in psychology, political science and economics has theorized about the questions that motivate this paper.[11] However, the goal of this paper – to link radical religious organizations, rich countries, and the tactic of suicide attacks – transcends the disciplinary boundaries set by the current literature. Rather than focusing on the strategic rationality of suicide attacks, our focus is on the tactical choice of suicide attacks as compared to more conventional insurgency tactics.[12]

Rational Martyrs[13]

Much of the terror generated by suicide attacks comes from the idea of an army of theologically-motivated suicidal drones. Yet they could be rational, given either: a) a belief in the hereafter combined with a belief that the suicidal act will be rewarded in the hereafter; or b) altruism toward family or compatriots combined with a belief that the suicidal act will benefit family, community or some larger cause (Elster 2005, Pape 2005); or c) a desire to maximize social solidarity achieved by sacrificing one's autonomy for group goals (Wintrobe 2006).

A given population is likely to contain at least some individuals who hold these beliefs and preferences. To be sure, mainstream Islam, like its theological cousins Christianity and Judaism, sanctifies human life.[14] Yet belief in the hereafter is widespread, as is belief in rewards in the hereafter. (In fact, most American Christians believe in heaven and most of those believers anticipate enjoying it (Iannaccone 1998)). In Islam, Sayyid Qutb's writings in Egypt in the 1950s on the "sacred jihad" lent support to suicide planners (Bergen 2002, 51). So while there is no

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[11]. We build on the work of Merari (1990) in psychology, Sprinzak (2000), Pape (2003, 2005) and Bloom (2005) in political science, and Wintrobe (2006) in economics.

[12]. See our review of Pape (2005), Bloom (2005), and Gambetta (2005) in Berman and Laitin (2007) where we highlight the limits of an approach the focuses on suicide terror is isolation from the range of insurgency tactics.

[13]. This discussion owes most of its content to a conversation with Larry Iannaccone.

[14] Neither Christianity nor Judaism has consistently extended that sanctity to civilians of other religions. Samson, who clearly targeted civilians, is memorialized as a martyr by both Jews and Christians.

clear religious connection to core suicide beliefs, aspects of all religions could be useful to radicals recruiting for suicide attacks.

Preferences for altruism or group solidarity, combined with a belief that the welfare of others will be improved by the act – may apply to both religious and secular terrorists. Ariel Merari carried out interviews with failed Palestinian suicide attackers and their families which suggested that altruism was more important that religiosity as a motivation.[15] In the case of suicide attacks not only is a sense of altruism required, but also an exaggerated belief in the benefit to their cause that will result from a successful attack. For instance, the September 11th terrorists may have believed that their act would help topple the Saudi government. A *Hamas* suicide bomber might believe that a single destructive act would make some significant contribution to creating an Islamic state in Palestine. These beliefs stretch credulity but reflect a common bias of decision-makers in overestimating their potential to affect change (Jervis 1976). The belief that through suicide one can experience the ultimate oneness of individual and group goals, as suggested by Wintrobe (2006) is also plausible.

Beliefs necessary for a rational martyr are not rare in a large population. While we lack estimates of the incidence of different beliefs, only a small proportion of the population need be committed believers if an organization exists which can identify and recruit a cadre of suicide attackers. Iannaccone (2006) points out that despite conventional wisdom about "brainwashing," research revealed that indoctrination played only a minor role in recruitment to US sects. Thus it may not be an unusual problem to find volunteers who prefer martyrdom to life, even without indoctrination. That's a disturbing thought. Yet only a few organizations in the world have managed to activate suicide attackers. Of those most are religious radicals. So what is so hard about organizing suicide terrorism and why are religious radicals so effective at it?

Terrorist Clubs: Radical Religious Groups as Social Service Provision Clubs

Critical to our understanding of the role of radical Islam in organizing armed rebellions is the recognition that these communities, like other religious sects, are commonly engaged in cooperative production of mutual insurance. Consider the following puzzle for the rational choice approach: religious sects prohibit common pleasurable behaviors and require sacrifices. Recruits must obey rules regarding diet, prayer, dress, hair, sexual practice, relations to constituted

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[15] Berman and Laitin (2007) discuss the literature on the motivation of suicide attackers. Hassan (2001) was the first to point out that suicide attackers do not fit the usual profile of suicidal youth and are not otherwise psychotic.

authority, and marital fidelity. Sacrifices such as burnt offerings irreversibly destroy resources. In European Jewry, a circumcision irreversibly labeled a child as Jewish, an act that might put his life at risk by destroying the option of pretending to be a gentile. A vow of fidelity or abstinence is also a form of sacrifice, since it permanently restricts activities. Volunteer work required of Mormons is a sacrifice of time with a foregone opportunity to accumulate human capital. Study in a religious institution represents a sacrifice of the alternative potential use of that time, be it in accumulation of human capital in secular studies or in accumulation of earnings.

Limiting choices and destroying resources are puzzles for social scientists trained in rational choice. Yet people voluntarily join groups that enforce prohibitions and require sacrifices.[16] These groups stubbornly defy price theory, persisting in time-intensive activities like communal worship, Sabbath observance and dietary restrictions despite the historical increase in the shadow price of time. Strict sects show no sign of disappearing and those with the most demanding practices are growing.[17] The modern Anabaptist traditions (such as the Amish, Mennonites and Hutterites) are holding their own while Ultra-Orthodox Jewry and Radical Islam are thriving, despite a multitude of time intensive requirements.

Iannaccone (1992) pointed out the puzzle of prohibitions and sacrifices and offered a solution, proposing that they are efficient institutions in the context of an economic club that provides services to members through cooperative production. This section summarizes his rationalization of religious sacrifices and extends the argument to cover militia activity as in Berman (2003).

Clubs

A social interaction model offers an explanation for sacrifices. Group members derive utility from (secular) consumption, *S*, and from time spent in religious activities, *R*, such as prayer and community service. They also gain utility from the level of a local public good *A*.

(1) $U_i = U(S_i, R_i, A)$ for i = 1 to N members,
$$U_1, U_2, U_3 > 0, \; U_{11}, U_{22}, U_{33} < 0 \,.$$

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[16] For a quasi-rational choice alternative, see Elster (1984).

[17] Adam Smith is the first economist to discuss sects (1965). Iannaccone (1998) describes the modern growth of conservative sects worldwide (p. 1471).

Good A is nonrival and excludable, making it a *club good*. Members get A from either a government, G, or the "club," C, which uses hours of religious activity as an input. Public safety is an example of a pure public good which could be provided by government or by a club, perhaps as a religious obligation. Welfare services, schools, hospitals and mutual insurance are examples of excludable, partially rival activities commonly provided by religious communities.

(2) $A = G + C(\{R_i\})$.

Members maximize utility subject to time and budget constraints. A fixed allocation of time, T, is split between the religious activity, R, and work hours, H, so that $R_i = T - H_i$. Income is earned from wages w and spent on consumption of the secular good, S, at price p, so that

(3) $pS_i = wH_i = w(T-R_i)$.

Club good C is produced by voluntary donation of time by members,

(4) $C(\{Ri\}) = C(\sum_{i=1}^{N} R_i / N)$.

These donations of time are difficult to monitor, since they are informal acts of charity, thus creating a free-rider problem. Sects apparently induce members to donate time by imposing a set of prohibitions such as dietary restrictions, dress codes and Sabbath restrictions which effectively reduce time devoted to activities outside the club. While this rationalization of religious prohibitions has no implications for our argument about suicide attacks, it should reinforce our faith in a club model of religious sects.

Efficient Sacrifice

Sacrifices are acts which irreversibly destroy value. They can be explained as an initiation rite that signals type (Camerer 1988, Iannaccone 1992) analogous to other forms of costly sacrifices that signal type, such as initiation rites in the military or hazing in fraternities. To explain sacrifices Iannaccone augments his base model with unobserved heterogeneity in the form of high wage (type 2) and low wage (type 1) individuals. High wage individuals choose less religious activity (in the upward-sloping part of a labor supply curve) as it is relatively more expensive for them, i.e., $R^2 < R^1$. (Heterogeneity could alternatively be in preference for religious activities at the margin. Heterogeneity in wages is chosen mainly to simplify the exposition.) Assume that the value of the benign club good is given by the average of R, as would plausibly be

the case in a mutual insurance club, where the average donation of time by members to mutual aid would matter.

High wage - low R individuals are potential "free-riders." They would like to join the high R club and benefit from its high average level of religious activity. Members of the high R (low wage) club would rather not admit the high wage types, as the reduction in the average level of religious activity would reduce club quality. Since access to the externality is excludable, the high R (low wage) group can rid their club of free riders by requiring a costly initiation rite, or *sacrifice*, which will exclude low R (high wage) individuals from joining, keeping C high, at $C=R^{1}$. Unlike religious activity, R, the sacrifice benefits no one except through its role as a signal. Potential applicants must reveal their type, which is otherwise unobservable, when they make a decision to sacrifice, or not to sacrifice, time.[18] A sacrifice inducing only low wage types to sacrifice is a separating equilibrium[19] so that a low wage club can hold together. That result will help us understand what it takes to hold a terrorist organization together in the discussion below.

The Production Function of Suicide Attacks

Now consider the agency problem of a violent rebel organization, such as guerrillas or terrorists. The potential victims will try to induce information leaks or defection at any stage in the conspiracy, from planning through the attack. For a suicide attack operatives will recruit an attacker, train him (or her), record a video, observe the attacker to be sure his or her resolve does not waver, procure explosives, identify a target, send the attacker on their way and then make a public announcement taking credit.

Figure 1: Operatives, Attacker and Target [About Here]

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[18] This view of a religious sect as social service provision clubs has testable implications. The stronger the sacrifice demanded of members, the higher the average level of voluntary religious activity and the greater the degree of mutual insurance. That implication is confirmed in Iannaccone's (1992) study of Christian denominations and supported casually in Berman's (2000) discussion of Ultra-Orthodox Jews. Among Muslims at least some radical sects are active at social service provision, including the *Hamas,* the *Hizbullah* and the Islamic Brotherhood in Egypt [Mishal and Sela (2000), Munson (2002)]. Other testable implications of the club approach to religion are supported by evidence on Ultra-Orthodox Jews (Berman 2000) and Indonesian Islamists (Chen 2003).

[19] See Iannaccone (1992) for a proof. For a formal derivation of the optimal sacrifice and a graphical explanation see Berman (2000).

Assume that *N* operatives are required, excluding the attacker. Each has some nonrival benefit *B* from a successful attack. Any one of those *N* operatives, including planners, has enough information to defect, destroy the operation, and collect a reward from the target's side, all with one phone call. Defection is not uncommon. Of the 189 Palestinian suicide attacks attempted between September 2000 and April 2003, fully 77 were prevented before the attacker detonated himself, presumably because someone provided information or defected (IDF figures, reported by Zeev Schiff, *HaAretz*, May 3, 2003). Sometimes the information may come from friends and family.[20]

Operatives jointly produce a club good. Each makes a binary choice of *R=1 (loyalty)* or *R=0 (defection)*. Together they produce a good

$$(5) \qquad B(\{Ri\}) = B(\prod_{i=1}^{N} Ri)$$

where *B(1)* is the value of a "successful" attack and *B(0)* is that of a failure, so that *B(1) > B(0)*. Assume that membership in this group is exclusive and that the benefits of success are shared in a nonrival manner among members (in prestige, political power, deterrence of an enemy).

To induce defection, the target's side would be willing to pay an amount *D* to prevent the damage inflicted, including both the direct damage and the indirect effect of a terrorized population. (Terrorism is probably a negative-sum activity as the replacement value of the damage to the victim may far exceed the value to operatives, *B*, so that *B<D*, even if *B(D)* is an increasing function.) Assume also that operatives have income from some outside sponsor (who value successful attacks) which is small but proportional *αD*, where *0<α<1*. Assume that a defector can extract the entire surplus, *D*, from the potential victim *D*.[21]

Now consider the payoffs of operatives in a club providing both benign public goods and the violent result of an attack. Substituting into equation (1), an operative who remains *loyal* enjoys utility

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[20] Although it is often noted that taped interviews with parents show great support for the heroic deeds of their children, these interviews are conducted *after* the attack. Parents know little beforehand, perhaps because they would have a powerful incentive to inform or induce defection.

[21] We assume away the hidden information problem faced by potential victims attempting to bribe club members into defecting. How would a potential victim know that someone claiming to be a defector was really planning to do any damage at all? That uncertainty prevents efficient Coasian bargaining, yet the fact that leaks occur and defection takes place indicates that defectors find some way of establishing credibility. Our results require only that the bribe offered to defectors be proportional to damage in some proportion exceeding α.

$$U(\frac{\alpha D}{N}, 1, G + B(1) + C(\bar{R})).$$

The first term is the payment from the outside sponsor split among N operatives which each consumes. The second term indicates the personal satisfaction for loyalty. The third reflects the augmented public good available to a loyal operative: government provisions, G, the benefit of a successful operation B, and the value of the benign club good C. A member who *defects* will be expelled from the community, receiving utility

$$U (D + w, 0, G).$$

He consumes the damage value D paid by the potential victim in addition to his outside wage, w, gets no satisfaction from doing his duty, and receives only government provided public goods. In all, each operative faces the incentive compatibility constraint

$$(6) \quad U(\frac{\alpha D}{N}, 1, G + B(1) + C(\bar{R})) \geq U(D + w, 0, G).$$

If that constraint fails for any of the N operatives, then the operation fails and all are exposed. We assume that the attacker will not defect.[22]

Suicide Attacks as a Tactical Choice

To analyze when suicide bombing is the chosen tactic, we introduce the possibility of apprehension. Let p be the probability that the attacker is apprehended, exposing the identity of all operatives. Apprehension is far more dangerous for the organization than the attacker dying because an interrogated attacker exposes operatives. Assume that exposure implies both a failed attack and capture or death of all operatives, which we (prosaically) treat as setting utility to zero for exposed operatives.

Consider the conventional attack. Apprehension probability is a function of the inherent "hardness" of the target, $p(h)$. The difficulty, or "hardness," of the target is denoted by the real number h, which represents an index of defensive measures by the target (or its government) and

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[22]. The defection decision of a suicide attacker would be like (6) (for operatives) but with two differences. First, it would be augmented with terms reflecting altruism or the hereafter. Second, the left hand side reflecting utility in the present would either be set to zero by the death of the attacker or would be given the very high value associated with group solidarity as in Wintrobe (2006). Operatives will not initiate an attack if the attackers' incentive compatibility constraint does not hold so the essential assumption is that if (6) holds for operatives then attackers are also incentive compatible. Suicide attackers seem to seldom defect.

topography (as in FL 2003). Targets can increase p by investing in protective measures, increasing h. The expected utility of an operative from a conventional attack in the model including apprehension probability is

$$(7a) \quad [1-p(h)] \ U(\frac{\alpha D}{N}, 1, G+B(1)+C(\overline{R})).$$

In contrast, the utility of an operative from defecting is

$$(7b) \quad U(D+w_i, 0, G).$$

These choices are illustrated by the solid lines in Figure 2, which graphs the utility of operatives on the vertical axis and damage done to victims on the horizontal axis.[23] The steep bold curve is the utility gained by defecting (7b). It increases most quickly in damage, D, because the full value of D is available to induce operatives to defect. It begins at a low level, for low D, because defectors draw no local public goods (B or $C)$ from the club.

Figure 2: Conventional Attacks, Suicide Attacks and Damage [About here]

For "soft" targets with a low probability of apprehension the utility of a loyal member (7a) from a conventional attack is represented by the upper solid curve. Utility for loyal operatives using the conventional attack is high even at low D because they benefit from club goods B(.) and C(.). It increases slowly in D because the subsidy is only αD (<D) and is split among N operatives. For low probability of apprehension conventional attacks and loyalty are preferred over defection for the entire range of damage (D) in the figure.

If we harden targets (i.e., the probability of apprehension, p , increases) expected utility for loyal operatives from a conventional attack falls; this is illustrated in the figure by the downward shift in the expected utility of a loyal operative. With high p the conventional attack is incentive compatible only for a narrow range of targets (0, D$_C$) for which expected utility from an attack (7a) exceeds that from defection(7b). This is how the model captures FL's results for insurgencies: topography, strong government, easily-profiled rebels and other environmental

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[23] These figures can be generated with simulated utility functions for specific parameters. The program generating the patterns in Figures 2 and 3 is available from the authors upon request.

factors that raise p will limit the targets that the insurgency can aspire to attack without operatives defecting. Conventional insurgency is limited to low damage activities.

For hard targets (high apprehension probability) suicide attacks become relevant. They are less dangerous for the operatives (other than the attacker) but require them to lose a cadre and compensate a bereaved family, which we represent as a cost -Z lost in a nonrival way by operatives, a club bad. Utility of an operative from a suicide attack is then

$$(7c) \quad U(\frac{\alpha D}{N}, 1, G + B + C(\overline{R}) - Z).$$

Assume that operatives are considering a target of difficulty, D, and have a willing suicide attacker. They then choose between the maximum of expected utility in expressions (7a), (7b) and (7c). The utility of a loyal operative from a suicide attack (7c) is illustrated by the serrated line in Figure 2. The operative's utility is relatively low for the suicide tactic at low damage because of the loss of the attacker *(-Z)*. Expected utility increases more quickly in damage for the suicide than for the conventional attack because the probability of apprehension affects only the conventional attack. Consider the hard target. The high probability of apprehension, p, is relevant for a conventional attack but does not affect the utility of a suicide attack. To the right of the point labeled D (for targets with damage greater than D_D) suicide attacks are preferred over conventional attacks as long as they are incentive compatible (D_D, D_E).[24] To the left of D, and at lower apprehension probabilities, the reduction in apprehension risk is not sufficient to compensate for the high cost to the club of losing a cadre, so suicide attacks are disfavored.

The analysis also captures conjecture C3: As targets harden and conventional attacks are disfavored (the solid curve representing the utility of a loyal operative in a conventional attack shifts downward), suicide attacks are increasingly preferred. For instance as defensive expenditures harden targets, expected utility from conventional attacks falls so the interval (D_D, D_E) of feasible suicide attack targets widens leading to less insurgency and more suicide attacks.

The analysis illustrated in Figure 2 also provides an explanation for the striking results of Table 3, which showed that, in contrast to conventional insurgency, nine out of ten suicide attacks targeted members of other religions. In these cases religious difference hardens targets by

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[24] . Note that in equilibrium D may be higher in conventional attacks if computed in a loss-of-life algorithm We compare D in market terms, i.e., how much state authorities would pay to prevent such an attack..

enabling profiling and raising the probability of capture (i.e., lowering the loyal operative's expected utility curve for conventional attacks in Figure 2) and making suicide attacks a dominant tactical choice for a wider range of targets.

Strong Clubs and Suicide Attacks

What type of rebel organization can thrive in a hard-target environment? Here the club model of radical religious groups yields our key analytical insight: *The stronger the social service provision of the club, the more loyal will be its volunteers for missions, and thus the more damaging will be its' suicide attacks.*

This result comes from the interaction of club strength, choice of tactics and damage. Clubs with the ability to screen out high wage operatives will have an advantage in such conspiracies. Consider heterogeneity in outside options, *w*, as above. Assume parameters are such that operatives with good outside options will defect while low wage types will organize a suicide attack (point F). I.e., there is some cutoff wage *w'* for which operatives are indifferent and $w^L <$ $w' < w^H$. A club with the capacity to extract signals of commitment (low wages) can successfully exclude those high wage applicants who haven't demonstrated organizational commitment.[25] These groups can more successfully implement a suicide attack than terrorist groups that cannot screen out potential defectors.

Figure 3: Strong Club Choose Deadlier Suicide Attacks [about here]

Figure 3 illustrates why suicide attacks are so difficult to organize. The utility of a defector from a weak club is shown by the upper bold line. His utility from defection is high because he has strong outside options, *w,* (or perhaps because he is not community-minded or would suffer minimally from his extended family being ostracized). His propensity to defect makes him a poor operative, allowing incentive-compatible suicide attacks only up to damage D_F where he will be indifferent between defection and loyalty. The suicide attack is only worth doing if it will create high damage (at F) and high damage implies high temptation to defect.

In contrast, a strong club has selected operatives with a lower utility from defection (and perhaps taken care to limit their outside options by having them choose seminaries and incarceration over school and work), as illustrated by the lower bold line. A strong club has lower

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[25]. Examination of (7) reveals why clubs put operatives with strong outside options (i.e., high w) under special scrutiny –they are more likely to defect. To be trusted, high wage operatives would need to compensate by making credible claims to organizational loyalty (e.g., that agents of the state murdered the claimant's brother or raped his/her sister). Thus high-wage recruits who pass the loyalty test should prefer to volunteer in low-wage high-sacrifice organizations to protect themselves from defection.

utility from defection for a given level of damage since members are selected to have worse outside options, as represented by the rightmost curve. Those operatives will prefer loyalty over defection up to damage level D_E . That advantage is expressed as an expansion in its capability to carry out suicide attacks, with no effect on the decision to carry out conventional attacks. The strong club will use a wider range of targets for suicide attacks (D_D, D_E), while the weak club will attack targets only in smaller damage range (D_D, D_F). Since operatives have utility which increases in damage, given that they have a willing suicide attacker recruited they will attack targets with the maximum damage which is incentive compatible (D_F for the weak club, D_E for the strong club). Thus, if the environment favors suicide attacks for both weak and strong clubs, the suicide attacks carried out by the strong club will be deadlier.

A second implication is also illustrated by Figure 3. *The stronger the social service provision of the club, the greater the proportion of its attacks will be suicide attacks.* Both strong and weak clubs will carry out conventional attacks in the interval $(0, D_D)$, where the value of the target does not justify losing a suicide attacker. Since the strong club has a larger range of feasible (incentive-compatible) suicide attack targets than does the weak club, we should expect to see a greater proportion of suicide attacks by the strong club if environmental conditions vary enough that the weak club sometimes has no feasible suicide attack options.

In the next section we test these two implications of the model.

Section 4. Testing the Extended Club Model of Terrorism

The behavioral model in the last section was designed to explain why religious radicals would choose suicide terrorism over conventional insurgency in a hard target environment. It generated two implications; the first links social service provision to the lethality of suicide attacks while the second links social service provision to the proportion of suicide attacks among terrorist attacks.

[Table 5 about here]

Data from Israel/Palestine and Lebanon largely support these implications. The combined dataset reports on suicide attacks between 1981 and 2003 in Lebanon and Israel/Palestine. Table 5 reports on organizations which have carried out both conventional and suicide attacks. While they were selected according to the criterion of having carried out at least one suicide attack, Figure 3 indicates that this is the range of organizations for which the model can make predictions. We

used the description of these groups in the ICT dataset (whose coders did not have our theory in mind) to see if there was any mention of social welfare provision by each organization, as an indicator of being a "strong club." That classification yielded two social service providing organizations, Hamas and Hizbullah, who carried out 63 and 44 suicide attacks respectively. The Palestinian Islamic Jihad carried out 37 attacks. It is a Sunni radical Islamic organization which shares the same theology as Hamas but has no social service provision network. Four nonIslamist organizations carried out suicide attacks in this period: The Martyrs of Al Aqsa (which is allied with Fatah), the Popular Front for the Liberation of Palestine (PFLP), the Fatah - the political party which dominates the PLO, and the Syrian Social Nationalist Party (SSNP).

As our model predicts, the two social service providing organizations are much more efficient (i.e., lethal) in their attacks. The Hamas average 7.2 fatalities per attack, while the Hizbullah average 17.4. The PIJ, Islamists who lack a social service provision capacity, average 4.0 fatalities per attack. The four secular organizations are all less lethal than that; the most important being the Fatah-affiliated Al Aqsa Martyrs who average 2.8. Taken together, the two organizations with social service provision networks carry out more attacks and are more lethal, averaging 11.4 fatalities per attack, as opposed to the five organizations without a social service provision network, which average 3.3 fatalities per attack. The difference in fatalities associated with social service provision, 8.1, is statistically significant.

The club model has a second implication, that strong clubs will choose the suicide attack tactic more often. Recalling the discussion of Figure 3, strong clubs attack targets in the interval D_F through D_E for which only the suicide tactic is effective, while weak clubs cannot attack those targets for fear of defection.

[Table 6 about here]

Table 6 reports all attacks by Palestinian organizations, including both conventional and suicide attacks. These data come directly from the ICT website and cover the years 1980-2002. The ICT distinguishes within the Fatah between Force 17, Tanzim and Fatah, to bring the total number of organizations to seven. Hamas and the Palestinian Islamic Jihad have the highest proportion of suicide attacks among attacks, with 35% each. The Al Aqsa Martyrs follow with 24%. All other organizations have 6 percent or less. With the exception of the PIJ, the pattern is as predicted by the model. Hamas, the strong club, chooses the suicide attack tactic at least as often as does PIJ, which has very little if any social service provision, and more than Fatah and

PFLP. The difference between the proportion of suicide attacks carried out by Hamas and the organizations with no social service provision capacity is nineteen percentage points and is statistically significant.

The fact that the PIJ chooses suicide attacks so often despite its lack of social service provision may indicate that theology and indoctrination have a role in motivating suicide attackers. Alternatively, the PIJ might incur a smaller loss, Z, from the demise of a cadre because, lacking political aspirations, they have less need to explain the loss to family and community and less eventual use for committed members. Nevertheless, our model helps explain PIJ's relative lack of effectiveness (see Table 5). We therefore see these results as broadly consistent with the model's prediction that strong clubs will exploit their organizational advantage in suicide attacks.

Section 5. Implications for Counter-Terrorism Policy

How to defend against suicide attacks? Notice that in a hard target environment once suicide attacks are being used, further hardening of targets affords little extra protection. This argument is illustrated in Figure 4, which shows the feasible set of attacks possible for a strong club. Consider the effect of further investments in raising the probability of catching an attacker (raising p or "hardening" a target). That would reduce the utility of a loyal operative, shifting the intersection point D_D to a lower level of damage at $D_{D'}$. That shifts some low value targets from the conventional to the suicide attack range. Since suicide attacks will be concentrated at the high damage end of their feasible range, hardening targets reduces the risk of attack on targets in the neighborhood of D, but only for low value targets. To make matters worse, defensive expenditures on hardening targets, such as airport security, guards in front of shopping centers and restaurants, or increased monitoring of borders tend to only shift risk between targets rather than reduce overall risk (Trajtenberg, 2006).

Figure 4: Protecting High Value Targets [about here]

Protecting high value targets against highly effective clubs *requires an altogether different approach.* Raising the probability of capture is of little use once the club has chosen the suicide attack tactic. A more productive strategy is to increase pressure to defect by competing with clubs. At higher defection probabilities these high value targets become infeasible (incentive incompatible) for operatives, so that organizations will not attempt to attack them for fear of

being compromised.

Referring again to Figure 4, imagine enhancing the return to defection for operatives in a strong club. That shifts upward the lower bold curve representing the utility from defection for a member of a strong club, which shifts the point of intersection D_E toward zero at D_E', making some *high* value targets infeasible. That can be achieved by improving options for operatives outside the club. Another method of protecting high value targets is by is weakening club provision of services (shifting the utility curve of loyal members downward) or equivalently, improving competing services provided by local government and markets. In Figure 4 that counter-terrorism tactic is illustrated by shifting the dashed line representing the utility of loyal members toward the horizontal axis at lower levels of utility. That also shifts the intersection point and the highest feasible level of damage toward zero at D_E'. Both these policy implications are consistent with the emphasis U.S. commanders in Iraq have requested on job creation and spending on local services (Baker and Hamilton, 2006). Job creation improves outside options and local services compete with the provision of the same services by Muktada al Sadr and other religious rebels.

The general conclusion from this discussion for counter-terrorism is that the threat of defection is a powerful force limiting the tactical choices of terrorist organizations. Radical religious groups with social service provision capabilities have an advantage because they have selected cadres for their loyalty, yet they are still vulnerable to defection. That was clearly demonstrated by the assassination of Abu Musab Al-Zarqawi in June 2006, who was reportedly located using information from an internal Al-Qaeda source transmitted to Jordanian intelligence, presumably in response to the $25m reward offered by the U.S. State Department. Considering the loyalty required of operatives in the face of such tempting incentives, it is critical to understand how these bonds of loyalty can be frayed. In this sense effective defending high value targets against suicide attacks requires recognizing the interaction of target hardness and the defection constraints faced by radical religious clubs, the organizations which are most effective in hard target environments.

Section 6. Extensions

Our model is not without problems. It is not obvious that our tests of the model would work in cases beyond Israel/Palestine and Lebanon. We therefore need to ask what insight this model gives for interpreting other cases. Here we address three cases – Iraq, Sri Lanka and Russia – where suicide attacks have taken place under different conditions.[26]

Iraq

New data compiled by Gambetta (2006) on suicide attacks in Iraq (May 2003 through January 2006) provide a further test of our model.[27] Gambetta distinguishes three groups of attackers: the Sunni groups of former Baathists; Al-Qaeda in Iraq; and Ansar al Sunna. The latter two are religious radicals, Al-Qaeda being foreigners and Ansar al Sunna from Kurdistan. Of the160 suicide attacks for which a target can be classified, 81% are aimed at coalition forces and are thus inter-religious. This figure is in line with the international data, in which about 90% of suicide attacks were against members of other religions (Table 3). It is also consistent with the prediction of the model and the findings in Table 4 for Israel/Palestine, that suicide attacks are reserved for hard targets.

More importantly, Gambetta finds that of the 152 suicide attacks for which he can name a perpetrator the two groups of religious radical terrorists are much deadlier, with Al- Qaeda averaging 39 deaths per attack (41 attacks) and Ansar al Sunna averaging 28 deaths per attack (8 attacks) and the Sunni Groups averaging a much smaller 10 deaths per attack (103 attacks). This pattern is consistent with the prediction of the model that, compared to the Baathists, religious radicals can permit themselves to carry out much larger attacks without violating a defection constraint (as illustrated in Figure 3) because their members are selected to have higher levels of commitment, as we found in Israel/Palestine and Lebanon.[28] An important caveat to that conclusion is that we know little about the social service provision by the groups from which Al-Qaeda Iraq recruits. That is a topic for further research.

A related insight is that the single most difficult challenge to nation building in Iraq appears to be creating an effective and loyal police force and army. Imagine drawing Figure 3 not

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[26]. Kalyvas and Sánchez-Cuenca (2005) analyze cases where suicide attacks might have been used but were not.

[27] Gambetta (2006), epilogue to softcover edition, p. 309.

[28] The higher number of suicide attacks among Sunni groups is not an indication of the proportion of suicide attacks among attacks. The number of Sunni group insurgents is estimated at 15,000 to 20,000 - about ten times the estimated number of Al-Qaeda fighters.

for a club but for the Iraqi police, and discussing the consequences of a police officer selling information or defecting. The loyalty calculation would similarly be informed by a discussion of services provided to loyal officers and bribes offered by insurgents for defection. The lesser the ability of the Iraqi state to provide basic services to police officers and their families, the more attractive will defection be for officers and the more difficult it will be to provide security.

Sri Lanka

In Sri Lanka, the LTTE's Black Tiger's use of suicide attacks highlights how specific our model is to asymmetric warfare. The Sri Lankan government is not strong enough to control the territory from which the LTTE operates, so that capture of an attacker does not trigger assassination or capture of operatives, as would likely be the case in Israel or Iraq. The Sri Lankan environment favors standard insurgency, which for the most part is what has occurred since 1984. That insurgency is not carried out by an organization which fits the club model: the LTTE is not religious,[29] does not provide social services exclusively to members and does not send valuable members on suicide attacks (Bloom 2005).

Even so, the club model provides insight into this case. For one, suicide attacks are reserved for targets for which conventional attack is unlikely to succeed. In the early years of the Tamil insurgency, as Swamy reports, most of the activity was intra-Tamil warfare, as many groups vied to become the monopoly representative of the Tamil population of Sri Lanka. For all the intra-Tamil killing, there were no cases of suicide attacks. Nor are there suicide attacks in the civil war within civil war taking place among Tamil Tigers in 2005 on the question of negotiation strategy with the Sri Lankan state. As Hopgood (2005, 72) points out, when the Sri Lankan Army launched Operation Liberation in mid-1987, which established military camps in the heart of the LTTE-controlled zones, the Black Tigers were formed to use suicide attackers (as substitutes for missiles) to go after these targets, as an alternative to cruise missiles (Hopgood 2005, 75). Second, the LTTE has recognized the immense problem of defection. Gambetta (2005) points out that the Black Tigers "are subject to a commitment pressure by having a ritual dinner with their leader, Pirabakaran, before the attacks—a subsequent defection would imply a catastrophic loss of faith." This suggests that our model's focus on the problem of defection is not particular to the

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[29]. The secular nature of the Tigers can be overstated. As their war developed against the Sri Lankan state, several observers have noted the use of Hindu symbols for purposes of recruitment, and that they increasingly rely on the language of religious martyrdom to justify and reward the sacrifice. They are not a radical religious club in any case.

Middle Eastern cases or to Radical Islamists.

Chechnya

Similar anomalies appear in the case of the two Chechen wars (1994-1996; 1999–) in Russia. In the first Chechnyan war, the so-called *boyeviki* (insurgents), according to Lieven "lack a military hierarchy and organization, formal training, formal commanders and tactical doctrine…" Lieven also notes numerous reports in the first war where "death squads shoot people [other Chechens] on the square, kill members of parliament inside the parliament building, and, finally shoot a dozen disloyal policemen at the city's police headquarters – the killing of Chechens by Chechens… ..In front of video cameras, Shamil Basayev executed an old man who had been a local administrator in his native village…" This was hardly a war organized by a coherent organization seeking to maximize effect by going after spectacular hard targets (Tishkov, 2004, quoting Lieven).

Yet, again, our model captures key strategic elements in the Chechen insurgency. First, the primary targets for Chechen suicide attacks are Russian civilian and military complexes, which are hard targets. The largely Eastern Orthodox Russian police and military profile Muslims from the Caucasus and keep them under strict surveillance. Conversely, soft targets (for example, the so-called Chechen traitors to the cause, who are not well protected by the Russian army) do not merit suicide attacks. Second, Chechen suicide attacks did not begin until after Wahhabi fundamentalists, funded by the bin Laden network, began operating in Chechnya. They provided locals with needed social services. There was, for example, a $1,000 reward for new converts, and families of converts got stipends of $100 per month during the war. In exchange, the Wahhabi demanded prohibitions and sacrifices. Women were forced out of the job market. The new religious leaders demanded "compulsory prayers, Arab clothes, a ban on shaving, banishment of the *ustazes* [Sufi shaykhs]," and clean breaks from family (Tishkov 1004, 172-6). These Wahhabis, Tishkov shows, have been the source of the suicide strategy. In sum, suicide attacks in the Chechen rebellion are associated with hard targets and religious radicals providing benign services.

Section 7. Conclusions

This paper combines data on suicide attacks and a theory of clubs to explain when suicide attacks are chosen as a tactic of rebellion. It was motivated by several unusual empirical patterns Though insurgencies typically target poor, hilly countries, suicide attacks are as likely to target rich, flat countries. Though insurgents often kill coreligionists, they seldom use suicide attacks to do so. Though many types of groups rebel, suicide attacks are favored by the radical religious.

To make sense of these patterns, we modeled the choice of tactics by rebels. We first asked what a rational suicide terrorist would have to believe and discuss the role of religion in those beliefs. Standard rational choice accounts find that with plausible utility functions, recruitment of martyrs does not require appeals to irrationality or utter fanaticism. The real test of the rational model is not to explain recruitment of attackers, but rather the management of operatives who will resist the temptation to defect when organizing high stakes attacks. To address this strategic problem, we proposed a club good model that emphasizes the function of voluntary religious organizations as efficient providers of local public goods. The sacrifices which these groups demand enable mutual aid but are also well suited for solving the extreme principal-agent problems in recruiting and managing operatives who will not defect. Thus, religious radicals are effective (but not necessarily unique) dispatchers of suicide bombers. The model also analyzed the choice of suicide attacks as a tactic, predicting that suicide will be used when targets are well protected and when damage is potentially great. Those predictions are consistent with the patterns that we earlier described. Our model had testable implications for tactic choice and for damage achieved by terrorists, which are supported by the data from the Israel/Palestine conflict.

A problem for our model concerns the relationship of wealth to tactic choice. In the model poverty should breed terrorism as it lowers the outside options of club members. That would appear to be inconsistent with the findings of Berrebi (2003) and Krueger and Maleckova (2003) who find that leaders and suicide attackers tend to have about the same income levels as their neighbors, and higher educational levels. This issue should be addressed with attention to selection, as pointed out by Becker and Posner (2005). The harder the targets, the more leaders will select the most educated cadre available who can be trusted, as shown by Benmelech and Berrebi (2006) using evidence from Israel/Palestine. One wouldn't think that bin Laden's lieutenants would choose illiterate Afghan Jihadists for flight school in Florida if disaffected

students in Europe were available. What this suggests is that attackers can be relatively well-to-do but they would be reliable to the extent that they have credibly foresworn outside options.

More theoretical and empirical work is needed in order to account formally for nonreligious-based clubs and the reliance on cadres with high outside options. Here we give only intuitions for future modeling. We still lack a standard dataset of suicide attacks in particular and terrorist attacks in general.[30] The data on total suicide attacks are very sensitive to definition. In the dataset presented herein, we did not count self-immolation or waves of soldiers marching into sure-death tank formations (as in the Iran-Iraq war) as examples of suicide attacks, and they surely bear a family resemblance to the phenomenon that we have isolated. But even with data on the dependent variables presented herein, there ought to be further tests of our model. For example, an observable implication of our model is that the more benign local public goods (mutual insurance, physical protection) provided to members, the lower the defection rate. That would be especially true when the state and market do not provide substitutes to these services, as in failed states. Another observable implication is that the higher the potential damage caused by the attacks, the greater the incentive to defect. These implications require testing beyond the Middle Eastern case.

While work still needs to be done for a fuller understanding of the logic of suicide attacks, this paper, through the use of a club model combined with a distinction between hard and soft targets helps explain three puzzles in the tactical choice of rebels. (1) Suicide attacks have seldom been used against coreligionists because they are soft targets and can be attacked with less costly tactics. (2) Suicide attacks target rich countries, again because they present the harder targets. (3) Suicide attacks have been used disproportionately by radical religious groups because as strong clubs they can more easily overcome the defection constraint. In environments of asymmetric warfare the hardness of targets gives a comparative advantage to clubs among insurgents, and so we should see more radical religious insurgents over time, as governments grow stronger and warfare becomes increasingly asymmetric. Since the U.S., other high-income countries and the allies they are willing to come to the aid of, present hard target environments to insurgents, radical religious clubs are the opponents these countries should expect to face. The policy implications are straightforward. Further hardening of targets can have only limited effect. In contrast, policies which encourage defection by improving options outside the club and by

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[30]. RAND analysts, for example, advertise a dataset of suicide attacks with far more observations than reported here, but the raw data are not publicly available (Hoffman 2003).

weakening club provision of services reduce the incentive-compatible space of deadly suicide attacks.

REFERENCES

Baker, James A. III and Lee H. Hamilton (chairs), The Iraq Study Group Report, November 2006; www.usip.org.

Becker, Gary S. and Richard A. Posner, " Suicide and Risk Taking: An Economic Approach," 2005; University of Chicago mimeo.

Benmelech, Efrain, and Claude Berrebi. "Attack Assignments in Terror Organizations and the Productivity of Suicide Bombers" 2006; Harvard mimeo.

Bergen, Peter L., Holy War, Inc.: Inside the Secret World of Osama Bin Laden , Touchstone: New York; 2002.

Berman, Eli, "Sect, Subsidy and Sacrifice: An Economist's View of Ultra-Orthodox Jews," Quarterly Journal of Economics, 2000; 115(3).

_____ "Hamas, Taliban and the Jewish Underground: An Economist's View of Radical Religious Militias," NBER WP 10004, October 2003.

_____ and Ara Stepanyan, "How Many Radical Islamists? Indirect Evidence from Five Countries." UCSD mimeo, October 2003.

Berman, Eli and David D. Laitin, "Symposium on Suicide Terrorism" in Perspectives on Politics; forthcoming.

Berrebi, Claude, "Evidence about the link between Education, Poverty and Terrorism among Palestinians," Princeton University mimeo, 2003.

Bloom, Mia, Dying to Kill. Columbia University Press: New York; 2005.

Camerer, Colin, "Gifts as Economic Signals and Social Symbols," American Journal of Sociology 1988; 96; S180-214.

Chen, Daniel, "Economic Distress and Religious Intensity: Evidence from Islamic Resurgence During the Indonesian Financial Crisis," MIT mimeo, November 2003.

Collier, Paul and Anke Hoeffler, "Greed and Grievance in Civil War,"2001; http://econ.worldbank.org/progarms/library

Cutter, Ann, "Tamil Tigresses: Hindu Martyrs," 1998; http://www.columbia.edu/cu/sipa/PUBS/SLANT/SPRING98/article5.html

Elster, Jon, Ulysses and the Sirens: Studies in Rationality and Irrationality. Cambridge University Press: Cambridge; 1984.

Elster, Jon, 2005. "Motivations and Beliefs in Suicide Missions," in Gambetta D. (Ed.) Making Sense of Suicide Missions.Oxford University Press: Oxford; 2005.

Fearon, James D. and David D. Laitin "Ethnicity, Insurgency and Civil War" American Political Science Review 2003, 97(1): 75-90.

Gambetta, Diego. Making Sense of Suicide Missions. Oxford University Press: Oxford; 2005.

Hamermesh, D. and N. Soss. "An Economic Theory of Suicide," Journal of Political Economy, 1974.

Hassan, Nasra, "An Arsenal of Believers: Talking to the 'human bombs.'" The New Yorker, November 19, 2001.

Hoffman, Bruce, "The Logic of Suicide Terrorism" The Atlantic Monthly, 2003.

Iannaccone, Laurence R. "Sacrifice and Stigma: Reducing Free-riding in Cults, Communes, and Other Collectives," Journal of Political Economy, 1992; 100; 271-291.

_____ "Introduction to the Economics of Religion," Journal of Economic Literature, 1998; 36; 1465-1496.

_____ "The Market for Martyrs." George Mason University mimeo, 2006.

Jervis, Robert, Perception and Misperception in International Politics, Princeton University Press:

Princeton; 1976.

Krueger, Alan B. and Jitka Maleckova, "Education, Poverty, Political Violence and Terrorism: Is there a Causal Connection? Journal of Economic Perspectives, 2003: 17, 119-144.

_____, "Does Poverty Cause Terrorism?" *The New Republic,* June 2002.

Mishal, Shaul and Avraham Sela, The Palestinian Hamas: Vision, Violence and Coexistence .Columbia University Press: New York; 2000.

Munson, Ziad "Social Movement Theory and the Egyptian Muslim Brotherhood," *Sociological Quarterly*; 2002; 42.

Pape, Robert A. "The Strategic Logic of Suicide Terrorism" American Political Science Review 2003; 97; 343-61.

Pape, Robert A. Dying to Win. Random House: New York; 2005.

Rashid, Ahmed Jihad: The Rise of Militant Islam in Central Asia, Yale University Press: New Haven; 2002.

Rosenthal, Howard, "Suicide Bombing: What is the Answer?" Princeton, mimeo, 2003.

Smith, Adam, An Inquiry into the Nature and Causes of the Wealth of Nations (Reprint of 1776 version) Modern Library: New York; 1965.

Sprinzak, Ehud, "Rational Fanatics," Foreign Policy, September/October 2000.

Swamy, M. R. Narayan. Tigers of Lanka: From Boys to Guerrillas. Konark Publishers: Delhi; 1994.

Tishkov, Valery, Chechnya: Life in a War-Torn Society. University of California Press: Berkeley; 2004..

Trajtenberg, Manuel "Defense R&D in the Anti-Terrorist Era," Defence and Peace Economics 2006; 17.

Weinstein, Jeremy, Inside Rebellion: The Politics of Insurgent Violence. Cambridge University Press: New York; 2006.

Wintrobe, Ronald, Rational Extremism . Cambridge University Press: Cambridge; 2006.

Data Appendix

This paper merges three datasets on suicide terrorism. The first is from Pape (2003, 357-60). The second is from the International Policy Institute for Counter-Terrorism, at the Interdisciplinary Center Herzliya, available on the web at: [http://www.ict.org.il/]. This version was downloaded Sept. 12, 2003. The dataset spans the years 1980 through December 2002, with the most recent suicide attack on November 22, 2002. However, there are only nine events recorded from 1980-87, so in effect the dataset covers fifteen years, 1988-2002. The third is from Pape (2005, Appendix I, "Suicide Terrorism Campaigns, 1980-2003"). The third is largely (but not perfectly) an update of the first, and now includes some of the events missing in the first that were included in the second. Our goal was to have as complete a listing as possible from events that made it in any of these compilations.

Some Descriptive Statistics on Suicide attacks

While suicide attacks (given the spectacular and deeply troubling moral narratives that accompany the reporting of them) dominate our headlines, they are a rarely employed tactic in insurgencies and cause few deaths. Tables A1 and A2 provide some descriptive statistics from our dataset. There have been 367 recorded suicide attacks perpetrated by attackers from thirteen different countries, with 41 percent of the cases coming from Israel.[31] Using just the integrated ICT dataset, suicide attacks represent less than 10 percent of all terrorist acts in the dataset.[27] Using the combined dataset, suicide attacks have accounted for 6,975 deaths, about 43 percent of them from a single day (September 11, 2001). Although the use of suicide attacks has tended to increase year-by-year over the past two decades (Table A2), if we consider the fact that since 1945 insurgencies have caused over sixteen million deaths, the tactic of suicide bombing appears as only a small footnote to that enormous death toll.[28]

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[31]. Most datasets classify the perpetrators as coming from the "West Bank". For purposes of this paper, the Palestinians are under the de facto control of Israel, and are fighting an insurgency either to take control over all of Palestine (capture the center) or to build a Palestinian state on some portion of current-day Israel. Suicide bombing is a tactic in the pursuance of this goal.

[27]. Criteria for what constitutes a terrorist act, and therefore a collection of the universe of cases of terrorist acts, are much disputed. In the ICT dataset, for example, there is a racialist bias. African terrorism appears if blacks kill white civilians, but not if blacks kill black civilians. There is also a pro-state bias, as state induced terrorism (e.g. the Sinhalese burning of Tamil properties in 1983) is not included. Suicide attacks, however, are less controversial for purposes of objective coding, making them more susceptible to descriptive statistical analysis.

[28]. In rather bad social science form, all too many papers seek to account for this outlier, obscuring the general situation for suicide attacks of high publicity and low deaths.

Coding Rules

1. There were 56 observations which appeared in both datasets.

2. There were 40 observations in the ICT dataset for the year 2002, which was past Pape's range. We included these in the full dataset.

3. There were 132 observations in Pape that were not in ICT. We added them.

4. Nine observations in ICT were in the years of Pape's range, but not included. We added them.

5. There were 2 events in Pape (Dec 15, 1981, Iraqi Embassy; Aug 15, 1993, Egypt) with insufficient information, that were not included in the merged dataset

6. There were 2 events in Pape (March 27, 2001, Hamas in Jerusalem) that was considered a single event in ICT. We considered it a single event in the merged dataset.

7. There was a single observation in Pape, on Al-Qaeda bombing of the US Embassies in Kenya and Tanzania; we counted this as two events (as they occurred in different countries, and we have a unique value for country of attack). We assigned half the fatalities to each country.

8. In Pape (2005) there were 136 new observations that were added to the dataset.

9. On number killed, if Pape (2005) was different from Pape (2003) for the same observation, we changed the fatality count to that of Pape (2005). This is most significant in the downward adjustment of fatalities for the attack on the World Trade Center in New York in 2001.

10. Whenever Pape and ICT differed on fatalities, we averaged the two counts, so some death counts are not integers.

11. Whenever Pape and ICT differed on group name of perpetrators, we deferred to ICT (all cases were in Middle East, and ICT had stronger explanations for choosing group).

12. For Sri Lanka, we counted as a missing value on religious differentiation if the bombing was in a crowd that was mixed in regard to religion; a genuine religious difference between perpetrator and target if the target was material (a ship; a government building; an army base) but controlled by the state; n.b. that there is religious differentiation if the bombing was aimed at a Muslim politician even he were from the North.

13. For Chechnya, the country of perpetrators is always the same as the country of victims (Russia). If it is reported that Chechen attackers attacked Russians, we count this as an inter-religious attack.

14. Country of attackers for attacks by Al-Qaeda in 2003 taking place in Iraq are coded as missing values.

TABLE A1: SUICIDE ATTACKS: DESCRIPTIVE STATISTICS

Number of Suicide Attacks in full dataset	367
Average Number of Deaths Per Attack (without 9/11/01)	19.0 (11.0)

TABLE A2: SUICIDE ATTACKS BY YEAR AND TOTAL KILLED

Year	Total Number of Attacks	Total Number Killed
1981	1	30
1982	1	74
1983	6	430
1984	3	36
1985	25	177
1986	3	33
1987	1	18
1988	1	8
1989	1	0
1990	3	7
1991	5	90.5
1992	1	3
1993	5	40
1994	10	118.5
1995	22	245
1996	24	295
1997	8	52.5
1998	16	407
1999	21	72
2000	27	243
2001	53	3192
2002	64	591
2003	66	813
Total	367	6975.5

TABLE 1: SUICIDE ATTACKS BY COUNTRY OF PERPETRATOR
1982-2003

PANEL A: CIVIL WARS AND SUICIDE ATTACKS

	1945-1999	2000-2003
Countries with new Civil War	69	na
Countries whose residents perpetrated Suicide Attack	9	7

PANEL B: SUICIDE ATTACKS BY COUNTRY

COUNTRY	SUICIDE ATTACKS 1946-1999	SUICIDE ATTACKS 2000-2003
Sri Lanka	66	21
Lebanon	44	0
Israel / Palestine	23	123
Turkey	14	0
Saudi Arabia	3	6
Egypt	1	0
Algeria	1	0
Pakistan	1	0
Syria	1	0
Iraq	0	20
Russia	0	20
India	0	5
China	0	1
TOTAL	154	196

Source: Civil war figure from the Fearon-Laitin replication data. Suicide Attack data is from Pape (2003), Pape (2005) and ICT, as described in the Appendix

**TABLE 2: PREDICTORS OF CIVIL WARS AND SUICIDE ATTACKS
BETWEEN COUNTRY REGRESSIONS**

Dependent Variable	Civil War Onset (indicator) 1949-1999		Suicide Attacks 1949-1999		Suicide Attacks 1949-2003		Mean of RHS variable 1949-99 (std. dev.)
log(GDP/capita)	**-0.011**	**-0.010**	-0.004	-0.003	0.01	0.01	1.10
	(.003)	**(.002)**	(.011)	(.011)	(.02)	(.02)	(1.03)
log(Mountains)		**0.0044**		0.005		-0.0003	2.18
		(.0016)		(.007)		(.0139)	(1.40)
R^2	0.11	0.15	0.001	0.004	0.003	0.003	
N (Country-years)	6575	6575	6575	6575	7172	7172	
Countries	161	161	161	161	161	161	

Note: Heteroskedasticity-robust standard errors in parentheses. The mean of civil war onset is 0.017. The mean number of suicide attacks is 0.018 from 1949-99, and 0.046 from 1949-2003. The suicide attacks variable counts suicide attacks in a country-year, where the country is that of the perpetrators. Palestinians are coded in Israel. Results are qualitatively robust to the exclusion of Israel.

Source: FL replication data is described in footnote #2 . Suicide attack data is described in the Appendix.

TABLE 3: RELIGIOUS DIFFERENCES BETWEEN PERPETRATORS AND TARGETED VICTIMS

	INSURGENCY	SUICIDE ATTACK
Proportion with religious difference	16.5%	87.4%
(standard error)	(3.6)	(1.8)

Note: An observation is a single attack in the right column and a country-year in the middle column. An insurgency is measured by the onset of a new civil war, as in Table 2. FL replication data is described in footnote #2 . Suicide attack data is described in the Appendix.

TABLE 4: ATTACKS ON ISRAELI RESIDENTS BY LOCATION AND TACTIC
Sept 2000 through July 2003

Location	Attacks	Fatalities	(of which) Suicide Attack Fatalities	Fatalities/ attack	Suicide attack fatalities / attack
West Bank and Gaza	17405	341	8	0.020	0.00046
Inside Green Line	730	511	401	0.700	0.54932
Difference	16675	-170	-393	**-0.680**	**-0.54886**
(std. error)				(0.017)	(0.05460)

Note: Standard errors are calculated by treating the expected number of fatalities per attack as a probability and assuming that attacks are independent.

Sources: Attacks, fatalities and fatalities due to suicide attacks inside green line are from the Israel Defense Forces spokesperson's office, as reported by Nadav Shragai in Ha'Aretz, September 26, 2003. Fatalities in West Bank and Gaza due to suicide attacks are from the ICT data for that period described in the Appendix.

TABLE 5: SOCIAL SERVICE PROVISION AND EFFICIENCY OF SUICIDE ATTACKS - ISRAEL AND LEBANON

Organization	Social Services*	Suicide Attacks	Average fatalities/attack (std. error)	Average fatalities by social service provision (std. error)**
Hamas	Yes	63	7.2 (0.9)	11.4 (4.9)
Hizbullah	Yes	44	17.3 (5.9)	
Palestinian Islamic Jihad	No	37	4.0 (1.0)	
Popular Front for the Liberation of Palestine (PFLP)	No	7	2.9 (1.0)	3.3 (0.4)
Martyrs of al-Aqsa	No	31	2.8 (0.8)	
Fatah	No	2	0.5 (0.5)	
SSNP	No	1	0 (-)	
Sum		185		
Difference				**8.1 (3.8)****

Source: Suicide attack data is described in the Appendix.

* In its review of terrorist organizations, the ICT mentions the provision by the organization of social welfare benefits to ordinary citizens, going beyond ideological, religious and military tasks.

** Standard errors allows for clusters of correlated fatalities within organizations.

**TABLE 6: TERRORIST ORGANIZATIONS IN ISRAEL
SELECTION OF SUICIDE BOMBINGS AS A TACTIC**

Organization	Social Services*	Attacks	Suicide Attacks	Percent suicide attacks	Percent by social service provision
Hamas	Yes	115	40	35%	35%
Tanzim	No	61	1	2	
Al Aqsa Martyrs	No	59	14	24	
PIJ	No	54	19	35	
Fatah	No	36	2	6	16
PFLP	No	16	1	6	
Force 17	No	9	0	0	
Total		350	77	22%	
Difference					**19**
					(5.0)**

Data from ICT dataset (http://www.ict.org.il/). As of December 2006 these data contain incidents for the period January 1980 through December 2002. These figures are not comparable to those in Table 5 since they cover a different period and they classify Fatah into more suborganizations (Tanzim, Al Aqsa Martyrs, Force 17, Fatah). We omitted Hizbullah from these calculations because the ICT dataset reports far fewer Hizbullah attacks in Lebanon than does the combined ICT/Pape dataset.

* In its review of terrorist organizations, the ICT mentions the provision by the organization of social welfare benefits to ordinary citizens, going beyond ideological, religious and military tasks.

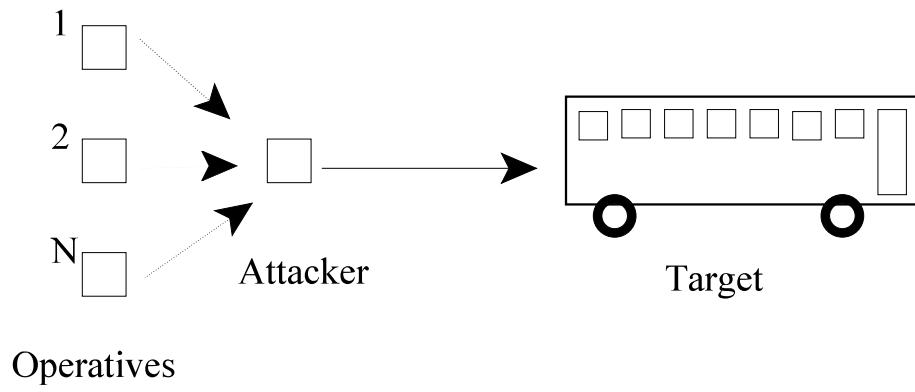** Standard error of difference calculated assuming independent attacks.

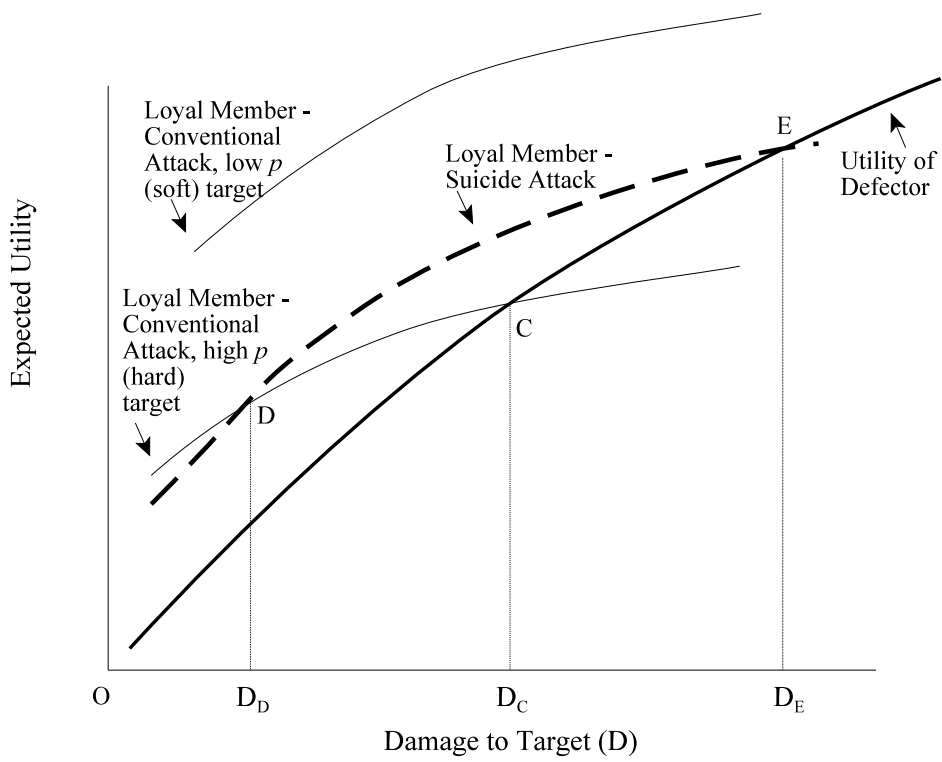**Figure 1: Operatives, Attacker and Target**

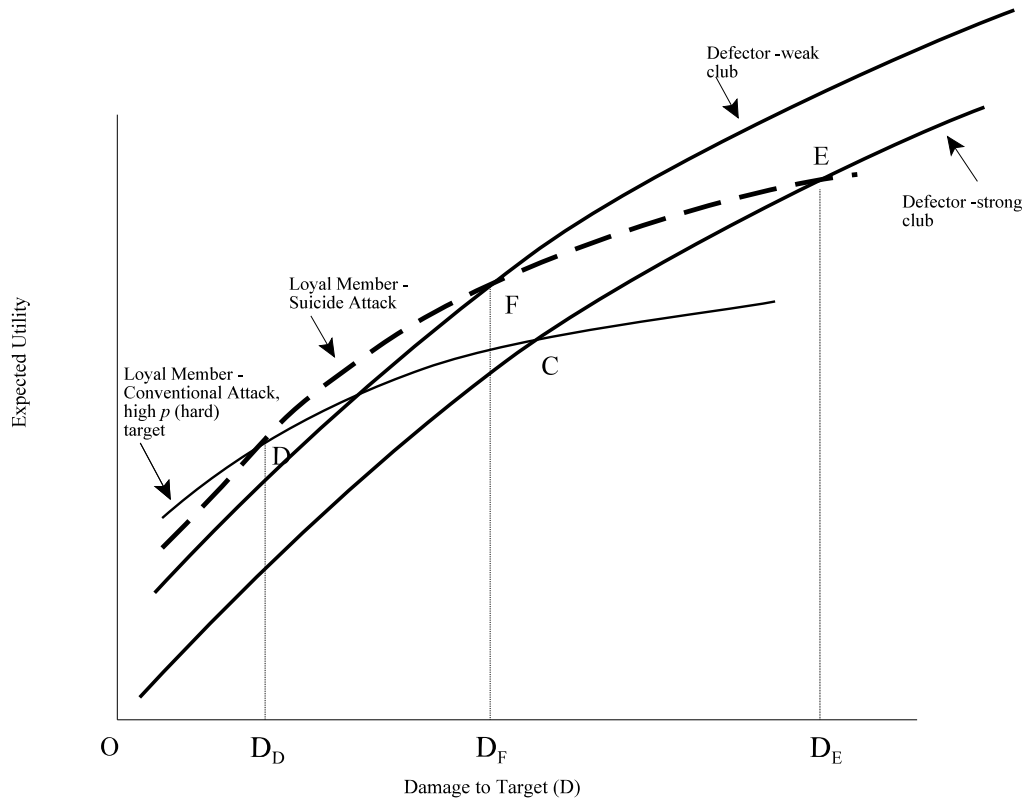**Figure 2: Conventional Attacks, Suicide Attacks and Damage**
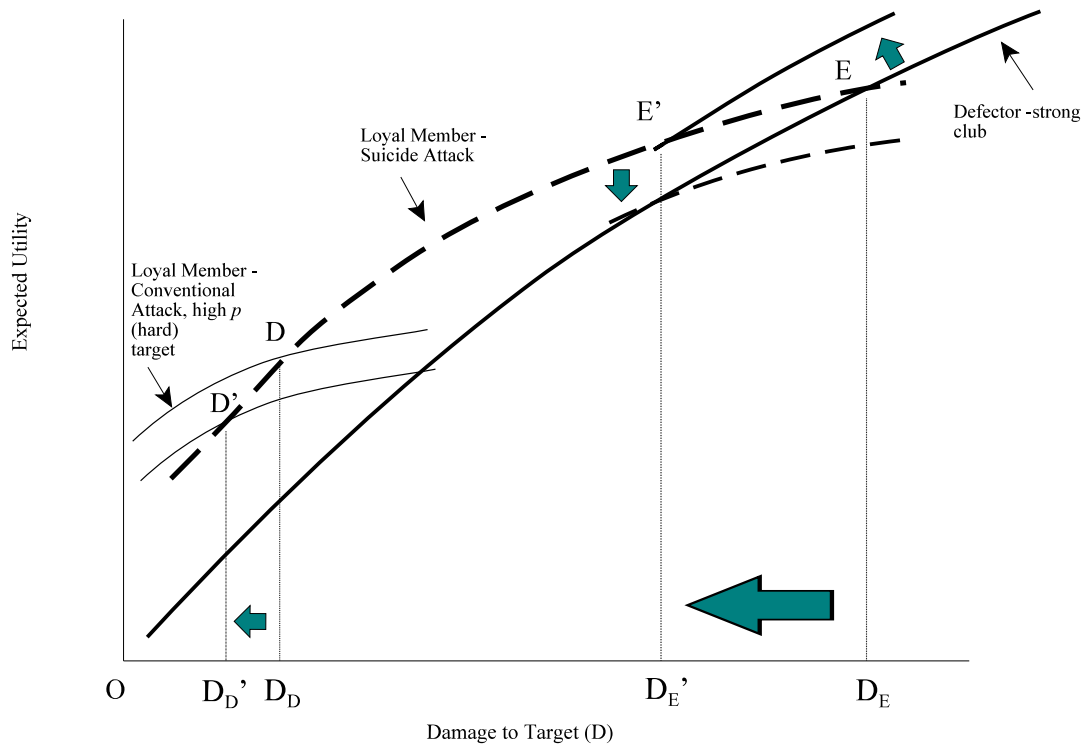
Figure 3: Strong Clubs Choose Deadlier Suicide Attacks

Figure 4: Protecting High Value Targets