



The strategic calculus of terrorism: Substitution and competition in the Israel–Palestine conflict

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Abstract

Previous work on the dynamics of conflicts where we see terrorism has tended to focus on whether we see shifts in attack mode following government countermeasures. We contend that many factors other than counterinsurgency can influence whether groups resort to terrorism, including competition between groups, as well as their relationship to public opinion and other political events. Hence, understanding terrorist tactics in prolonged conflicts with multiple actors requires us to consider a more general framework of innovation, imitation, competition and dependence between actors. We use disaggregated data on terrorist attacks, counterterrorism and public opinion in the Israel–Palestine conflict to jointly evaluate predictions derived from several conventional theories of strategic behaviour. We find that the strategic calculus of Palestinian groups is complex and cannot be treated as time invariant. Our results suggest that factors such as the degree of public support, inter-group competition, the anticipation of countermeasures and non-trivial non-violent payoffs have an observable effect on the strategic behaviour of the Palestinian groups, and that structural relationships are often far from constant over time.

Keywords

competition, Israel–Palestine, strategic calculus, substitution, terrorism

Introduction

Terrorism, or the use of violence to create fear for political purposes, has attracted a great deal of scholarly interest, especially after the 11 September 2001 attacks against New York City and Washington, DC, the 11 March 2004 train bombing in Madrid and the 7 July 2005 London bombings. These recent events have led to a renewed interest in previous work on terrorism and the use of terrorism in other conflicts prior to these attacks. Despite the international nature of these attacks, where Islamist groups attack targets in

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other industrialized countries, the bulk of terrorist attacks tend to be much more local in character, with groups targeting local governments to advance certain local political goals.

Some observers describe terrorists as ‘evil’ and irrational political or religious fanatics. However, terrorism is a strategic tool used for political purposes rather than merely haphazard or expressive acts (Bell, 1990; Enders and Sandler, 1993). Terrorism is very much a ‘weapon of the weak’ and particularly likely to be used in asymmetric conflicts. The resort to terrorism by the weaker side that lacks the capacity for conventional warfare can potentially and to some degree counterbalance the terms of the conflict by substituting fear for real military might. Moreover, the resort to terrorism is not a constant tactical choice. Many groups that have used terrorism at some point have switched to other strategies under other conditions. For example, the African National Congress carried out a number of bombing attacks through its military wing Umkhonto we Sizwe, explicitly citing the lack of real opportunities for other actions under the South African government, but also lacking the capacity for effective conventional warfare against its opponent. However, the ANC suspended these operations once the South African government removed the ban on the organization and indicated a real willingness to enter into substantial negotiations.

Statements by terrorist organizations themselves strongly attest to their strategic use of such tactics, both with regard to carrying out attacks and to call for caution. For example, in a statement made on 10 January 2003, Hamas founder Sheik Ahmed Yassin asserted the strategic value of suicide attacks, arguing that ‘Iraq could win if it equipped its citizens with explosive belts and turned them into human bombs’. In contrast, on Friday 26 March 2004, Hamas organizer Osama Hamdan instructed allied organizations that:

The lone suicide martyr method has scored great achievements, but now, as we stand at the threshold of a decisive stage, we must resort to a tactic that brings us the desired results; I therefore tell you not to hurry to exact revenge. We have to be sure our assault is concerted and perfectly orchestrated. Don’t waste resources and manpower on small operations. (Cited in *IsraPost*, online at <http://tinyurl.com/yjkh623>)

These and similar statements by other organizations strongly suggest that both the general and the specific use of terrorism is often a carefully calculated choice. However, we still know relatively little about the strategic calculus of terrorism for two primary reasons. First, existing research has tended to focus exclusively on particular individual factors as driving the resort to terrorism, such as government counterterrorism efforts or its relationship to public opinion, but rarely considered how such factors may interact with one another in shaping the context in which actors choose terrorist tactics. Second, existing research has tended simply to count violent terrorist attacks and how these frequencies correspond with particular factors, but rarely considered or distinguished between their specific tactical forms (e.g. hostages, arson, etc.) or their severity (i.e. the number of casualties).¹ The implicit assumption has thus been that all violent events convey roughly the same information about a group’s strategy and goals. But, clearly, terrorism comes in many forms, and it is known that differences in the degree of severity matter a great deal (Clauset et al., 2007). For instance, the political impact of severity is

illustrated by how the severe attacks of 11 September 2001 in New York and Washington DC, and the 7 July 2005 bombings in London, stimulated much more dramatic political and economic responses than incompetent and non-severe attacks such as Richard Reed's shoe-bombing attempt, or the London copy-cat attacks of 21 July 2001.

In our view, a full understanding of terrorism requires us to look beyond counting incidents to also consider its severity and its strategic character. One piece of this more complete understanding must be to assess a group's strategic choices and constraints – that is, the range of viable options, both violent and non-violent, and the limits to action, perhaps induced by organizational dynamics, its host populace or competition from other groups. Without this understanding, government countermeasures may be less effective than they could be, and scarce resources may be used to protect targets that are unlikely to be attacked and against tactics groups are unlikely to use. In the worst cases, countermeasures may actually be counterproductive, to the extent that they could instead serve to further the terrorist's goals (Mueller, 2006; see also Ganor, 2008).

In the following, we first review existing work on the resort to terrorism, synthesize key claims and propositions, and expand on why we believe that existing work is too narrowly focused. In order to better understand the context of terrorism, we examine the Israel–Palestine conflict, where detailed data exist that allow us to examine a large number of propositions empirically.

Strategy and terrorism

Previous work on the strategic character of terrorism has focused on several aspects believed to make terrorism more or less likely. Perhaps the best studied of these is the phenomenon of *strategic substitution* following state counterterrorism efforts (Landes, 1978; Enders and Sandler, 1993, 2004), where groups change tactics after the state's actions increase the cost of the current terrorist tactic relative to some alternative. For instance, a vector autoregression analysis of the relative attack-mode frequencies bracketing the introduction of metal detectors in US airports lends support to the hypothesis that the detectors decreased the frequency of aeroplane hijackings, but increased the frequency of other kinds of hostage situations (Enders and Sandler, 1993).

Other studies have highlighted the *political rationale* or advantages accruing to groups from the use of terrorist tactics. Pape (2003), for example, argues that suicide attacks are most typically used in asymmetric conflicts over territory, since they have proved to be a useful approach to wearing out the resolve of the occupying forces, which eventually may lead to their withdrawal from the disputed territory. Brym and Araj (2006) argue that the impetus for terrorist attacks arises from the desire to retaliate against government repression (see also Araj, 2008). In this sense, terrorism can become more frequent and severe through action–reaction dynamics and escalating conflicts between the parties.² Bloom (2004) highlights how suicide attacks can become popular, as these are thought to serve the dual purpose of severely wounding the enemy and raising the public profile of the attacking group.

Other researchers have suggested that conflicts where there are multiple and potentially *competing* groups on the insurgent side can display very different dynamics and prospects for termination than groups where there is a single organization operating as a

hierarchical organization with a central leadership (Cunningham, 2006). In the context of terrorism, attacks by one group can serve the role of a ‘spoiler’ to prevent other groups from engaging in non-violent political tactics like peace talks (Kydd and Walter, 2002). Moreover, groups may resort to terrorism as part of their competition with other groups (Bloom, 2004).

Many previous studies have evaluated propositions relating these factors to terrorism empirically. However, although such studies have shed considerable light on the strategic character of terrorism, they have not typically considered more than a single aspect of the strategic calculus of terrorism. As such, our understanding of how groups actually behave in complex conflicts remains limited. In this article, we consider substitution in light of counterterrorism efforts, competition between groups, and the role of public opinion. Our basic premises are: (1) that terrorist organizations are innovative agents, rather than passive actors that merely adapt to government countermeasures, and (2) when a conflict is characterized by several terrorist organizations, their actions are not independent, and they may compete with each other for political support or learn from each other.

Moreover, existing empirical research has often looked at highly aggregated measures of terrorism, often yearly counts by country, despite the fact that large databases of individual events, e.g. the ITERATE dataset (Mickolus et al., 2004), the MIPT dataset (National Memorial Institute for the Prevention of Terrorism, 2006), or the GTD dataset (Global Terrorism Database, 2009), allow researchers to disaggregate trends by actors and time in more insightful ways. However, comparative analysis of a large set of conflicts can be difficult if the strategic calculus of terrorism is complex and sensitive to other features of the political context. In particular, the relationships may not be stable across conflicts or over time, and may depend on idiosyncratic political events specific to each conflict, which may be difficult to compare across conflicts. As an alternative, we here propose to test and consider the scope for conventional theories within the context of a single conflict, where we can get more detailed data and carefully examine the political context. We use empirical data on recent events in the Israel–Palestine conflict as a model system of the context where terrorism is used, which we, in turn, hope will allow us to make progress to extend our understanding to more general theories of terrorism.

We comment in the following section on why we believe that the Israel–Palestine conflict is an appropriate model system. First, however, we comment briefly on our empirical approach. We note that our approach is explicitly data-centric, in the sense that we do not posit any complete mathematical models of terrorist behaviour from which we derive formal propositions, but instead draw on empirical data from a number of sources to evaluate a number of plausible and potentially competing conjectures. Although model-centric approaches can be a powerful way to test specific theories, it is unclear whether it is possible to simultaneously model the several theories mentioned above, and one might question whether these theories are sufficiently well-developed and specified that they are best approached formally. Moreover, many key features often cannot be observed directly. For many potentially important factors, such as the financial stability of a group and its recruitment concerns, data are scarce, of poor quality or non-existent. In many conflicts, even the most basic data on the public support of terrorist activities do not exist. In contrast, a data-centric approach provides some flexibility in evaluating

theories primarily through observable characteristics of conflicts, i.e. features that are quantifiable and measurable, and allows us to discover novel statistical patterns or relationships not embodied in current theoretical explanations. The drawback of this approach, of course, is that it leaves some room for ambiguity in terms of confounding effects. Still, we find that focusing our attention on the observable characteristics of the conflict in this case allows us to draw several reasonably clear conclusions about the strategic behaviour of Palestinian groups. In particular, we find that factors such as inter-group competition and the degree of public support seem to have a strong influence, often simultaneously, on the strategic use of violence by the Palestinian groups. Furthermore, we find that substitution, public support and spoiler effects are all considerably more complicated than previously thought.

Substitution and competition in the Israel–Palestine conflict

The Israel–Palestine conflict is ideal for examining strategic behaviour for several reasons. First, it is intrinsically important, and has given rise to a very high share of the recorded terrorist events worldwide since 1968. As many as 3,017 (10.6% out of a total of 28,445) events in the MIPT terrorism database (2006) were located in Israel or the Palestinian territories, and many resulted in at least one casualty (1,057 or 8.3% of 12,726). Second, the conflict is complex in terms of the number of actors and their relationships. There are many Palestinian groups, and the competition between them is well documented, as witnessed by the rivalry between Fatah and Hamas. Third, unlike many other conflicts where terrorism is used, there are several detailed data sources on the Israel–Palestine conflict. In particular, we have direct data on government counterterrorism efforts and public opinion on support for the different actors. This in turn enables us to examine and revisit the conclusions of prior studies on how countermeasures and public opinion impact on terrorists' violent strategies.

We start with a brief overview of the conflict. Our focus here is on the situation of Israel and the Palestinian territories and the resort to terrorism there, and, as such, we do not examine terrorism in extra-regional extensions of the conflict, such as the 1972 Black September incident when Palestinian militants held Israeli athletes hostage in a third country. Our review is necessarily selective, intended to serve as a background for our subsequent analysis, and we refer the interested reader to Bickerton and Klausner (2004), Eckstein and Tsiddon (2004), Gerner (1994) or Kimmerling and Migdal (2003) for more comprehensive overviews.

There is a long history of conflict and occasional cooperation between Arabs and Jews in the territory currently known as either Israel or Palestine. Indeed, terrorism in this region precedes the establishment of the state of Israel, as Jewish groups such as Irgun Tsvai Leumi used terrorist strategies to force the UK to give up control over the territory of Palestine.³ The main lines of divisions in the modern Israel–Palestine conflict were shaped by the 1947 creation of the state of Israel and the failure of United Nations General Assembly Resolution 181 to divide the territory into an Arab and a Jewish part. There have been several international efforts to foster negotiated settlements (notably the 1991 Madrid conference and the 1993 Oslo Peace Accords), yet the conflict has proved persistent and difficult to resolve.

Unlike many other struggles for autonomy, the Palestinian side has not coalesced into a vertically organized, state-like institution under the leadership of one dominant organization. Instead, the Palestinian side of the conflict consists of many distinct organizations sharing a loose ideological or political bond, and often a complicated historical and political relationship with each other. The umbrella organization known as the Palestine Liberation Organization (PLO) was set up at the initiative of other countries in the Arab League in 1964. It includes a large number of organizations and has no centralized leadership. The PLO was never a coherent organization, and the Palestinian side has become increasingly fragmented following disputes over the Oslo agreement, the idea of a two-state solution and whether to engage in negotiations with the Israeli side more generally. The largest faction, Fatah, has been dominant since 1969, and has a largely secular orientation. Traditionally, Fatah has emphasized conventional armed struggle and guerrilla warfare against Israeli military targets, and, more recently, negotiations with the Israeli government. Since the start of the Second Intifada in 2000, however, groups connected to Fatah, including the al-Aqsa Martyrs' Brigade, have carried out numerous terrorist attacks against civilians.⁴ The second largest faction of the PLO, the Popular Front for the Liberation of Palestine (PFLP) has a Marxist orientation, and at one point left the PLO. It has rejected the Oslo agreement, and has generally been sceptical of negotiations with Israel. The PFLP carried out numerous aeroplane hijackings in the 1960s and 1970s, but has recently switched to attacks against civilians in Israel. The now prominent Hamas movement, formed in 1987 in opposition to the Oslo agreement, seeks to create an Islamic republic. Hamas has never been part of the PLO, and rejects a two-state solution and recognition of Israel. Hamas has emphasized the provision of social services in the occupied territories, but has also engaged in terrorist attacks, and was the first group in this conflict to use suicide attacks in 1993. Another group not affiliated with the PLO that has engaged in terrorism on the Palestinian side is the Palestinian Islamic Jihad (PIJ), which has links to Hezbollah in Lebanon and is believed to be supported by Iran.

A conceptual model of Israeli and Palestinian interactions

To help the reader place our empirical analyses within a unified context, we introduce a simple conceptual model of the structure of relevant interactions between groups in the Israel–Palestine conflict. The schematic model in Figure 1 is in no way meant to be a formal model in the statistical or mathematical sense. Rather, it is simply a way of representing and organizing the many types of linkages and actions by both Israel and the Palestinian groups.

Clearly, Palestinian actions and Israeli countermeasures are likely to be related to one another, as suggested by theories of deterrence or substitution following countermeasures or theories of escalation. However, interactions between Palestinian groups and the Israeli government are in our view unlikely alone to provide much insight into the resort to terrorism, and it is unreasonable to think that the individual groups respond independently to the government. Most importantly, we expect the inter-group competition for the support of the Palestinian people to be crucial for the success of any Palestinian group. A competitive environment between the different factions implies that one group's optimal response or action to increase its support among Palestinians is partially

a function of other groups’ actions and responses. Thus, in Figure 1 we represent the interplay of these factors as a ‘sandwich’ in which the Palestinian groups vie for, and depend upon, the support of the Palestinian people, subject to the constraints imposed on them by the actions Israel takes to protect itself.

We note that there appears to be relatively good historic evidence for exactly this kind of interplay between organizations on the Palestinian side. Fatah, in part through its dominance of the PLO, has been the central organization on the Palestinian side. However, the involvement of its leadership in negotiations with Israel and the Oslo Accords in the early 1990s was unpopular among large segments of the Palestinian populace, which led to a haemorrhaging of Fatah’s public support. Moreover, Fatah’s perceived ineffectiveness in terms of providing basic security and social services to the Palestinian people and the perceived corruption among its leadership have further undermined its popularity. These shortcomings provided opportunities for other organizations to increase their support by opposing or filling-in for Fatah. Hamas, in particular, has successfully capitalized on Fatah’s woes by the provision of social services in an efficient manner, the relative lack of corruption among its leadership, and, through its suicide attacks, the perception of strong resistance to Israel’s incursions into the Palestinian territories. If the relationship between different Palestinian groups is indeed competitive, then they should be treated as separate groups. Many previous studies of the Israel–Palestine conflict, however, have treated each side of the conflict as a single actor (see, for example, Goldstein et al., 2001), thus obscuring any competitive behaviour on the Palestinian side – an abstraction that is reasonable only if separate groups apparently pursue a common goal utilizing coordinated behaviour. In this study, we treat differently named groups in our data as separate actors.

Several propositions on when we should expect to see a resort to terrorist activities can be stated in terms of this conceptual model. The arguments about substitution following counterterrorism would suggest that terrorists primarily respond to counterattacks by

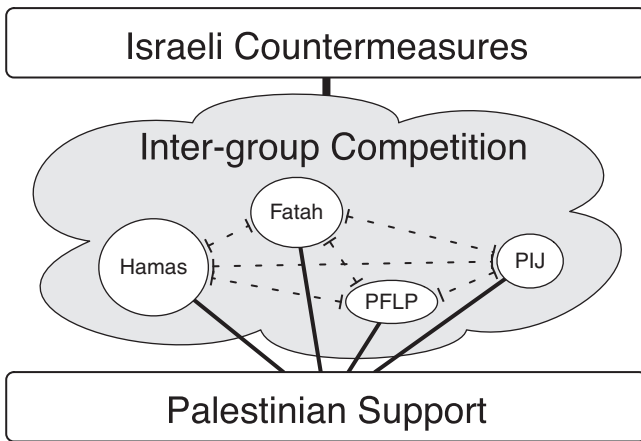


Figure 1. The ‘sandwich’ conceptual model of the Israel–Palestine conflict, illustrating the three primary constraints on the strategic decisions made by Palestinian groups

the government and change their behaviour accordingly. In contrast, the escalation and retaliation argument implies that we should see an increase in attacks following counter-measures. Arguments about group competition imply that groups should resort to attacks when these can be politically advantageous. Actors may emulate other groups and switch to more lethal forms of attacks when these have proved advantageous to other groups.⁵ Moreover, we would expect there to be some relationship between public opinion and the use of specific attack modes. The fact that these effects can all appear simultaneously, however, means that we must be sensitive to the potential complexity of the conflict. Relationships may change over time, and other changes in the political context may induce shifts in strategies. With this conceptual model, and the corresponding predictions, in hand, we now turn to empirical analysis of these expectations.

Empirical data

We draw our terrorist incident data from the National Memorial Institute for the Prevention of Terrorism (2006) database.⁶ This database contains information about terrorist events worldwide between January 1968 and June 2006. It provides the event date, target, city (if applicable), country, type of weapon used, terrorist group responsible (if known), number of deaths (if known), number of injuries (if known), as well as a brief description of the attack and the source of the information. The MIPT database contains both transnational and purely domestic events, and has been used in several recent studies of terrorism (Bogen and Jones, 2006; Clauset et al., 2007). The perhaps better known and more commonly used ITERATE dataset (Mickolus et al., 2004) is limited to transnational events. Here, we consider only those events that occurred in the conflict region itself, i.e. Israel, and Gaza or the West Bank.⁷ This yields a total of 3,017 events, 81.6% of which have occurred since the beginning of the al-Aqsa Intifada in September 2000. When it becomes relevant which of the 48 groups is associated with a particular event, we restrict our analysis to Fatah, PFLP, Hamas, PIJ and the catchall group ‘Unknown/Other’, as these account for over 90% of the Israel–Palestine events in the database; in terms of violent events, these five can thus be considered the primary actors in the conflict. Table 1 summarizes these events by group.⁸

Table 1 A summary of the events and casualty statistics for each of the main actors on the Palestinian side of the Israel–Palestine conflict, through June 2006

Group name	Total incidents	Total casualties	Suicide events	Suicide casualties
Fatah	180	1596	22	640
Popular Front for Liberation of Palestine (PFLP)	63	505	7	161
Hamas	543	3474	50	2485
Palestinian Islamic Jihad (PIJ)	150	1165	29	787
Unknown/Other	1798	2754	38	485
Subtotal (5 groups)	2734	9494	146	4558
Percent of total (48 groups)	90.6%	81.9%	94.2%	94.3%

To examine the relative popularity of different terrorist groups, we draw on public opinion data from the Palestinian Center for Policy and Survey Research (2007), which routinely conducts polls on a variety of issues in different areas of the Palestinian territory.⁹ Of the large amount of data in these polls, we focus specifically on the questions asked between 1994 and 2006 concerning how much support individuals give to Fatah, PFLP, Hamas and the PIJ, respectively.

To examine the extent to which interactions between Palestinian groups are competitive or generally cooperative, we draw on the Levant data, which are derived by the Kansas Event Data System¹⁰ from automated coding of English-language news reports. These data identify specific events where a particular actor, i.e. the source, carries out an identifiable action against another actor, i.e. the target (see Schrodtt and Gerner, 1994, for further discussion on coding event data). For simplicity, we focus primarily on the relationship between Hamas and Fatah here, and consider all interactions between Hamas and PLO/Fatah/Palestinian authorities. The event codes in the Levant data are classified in terms of a set of different categories, known as WEIS codes (after the earlier World Event Interaction Survey data project). These event categories can in turn be mapped onto a numerical scale of conflict cooperation, created by Goldstein (1992), which ranges from -10 for the most conflictual behaviour to +10 for increasingly cooperative events. These events can then be summed over a period for an aggregate measure of relations between parties. Here, we aggregate by week, and assign a score of zero to weeks with no recorded events.¹¹

Finally, we draw on counterterrorism data from the Israeli Ministry of Foreign Affairs (2006). The Ministry provides brief reports of Israeli anti-terror activity from 1995 onward.¹² Events are coded as counterterrorism measures if they indicate active Israeli operations against terrorist threats, such as the confiscation of funds or direct attacks on terrorist operatives and/or their supporters. We define active counterterrorism efforts as those which require targeted decisions by Israeli officials, while passive efforts encompass environmental and physical barriers, such as the security fence project initiated in May 2002. For the most part, our analysis of countermeasures takes place after 2002, so we assume the fence had a constant, likely decreasing, effect on terrorist incidents over the entire period. Other reports in the Ministry's anti-terrorism data describe events not related specifically to counterterrorism efforts, such as government statements on prisoner exchanges, announcements or condemnations of violent activities; we exclude these from our analysis.

Attacks and countermeasures

We begin by considering the relationship between terrorist attacks and countermeasures, and the accuracy of the conventional theory of substitution. Recall that this theory suggests the frequency of subsequent attacks should depend mainly on the state's countermeasures.

During the al-Aqsa Intifada (September 2000 to the present), Israel's active counterterrorism efforts fall within two qualitatively different strategies. First, prior to the end of 2003, we find that changes in Israel's activity level in a given month are strongly anti-correlated with changes in the number of suicide incidents in the previous month

($r = -0.47, p < 0.01$).¹³ That is, during this period, we suggest that Israel directly reacted to Palestinian attacks, effectively pursuing a tit-for-tat strategy where one actor escalated their activity in response to the other's recent activity (Figure 2a). Indeed, the cross-correlation function (CCF) of Israel's activities to the number of suicide attacks peaks strongly at a $\tau = -1$ month lag (Figure 2a inset), indicating that Israel's response rate was most highly correlated with the Palestinian suicide attack rate from the previous month. However, we do not have a perfect tit-for-tat cycle, which would lead to a pattern of mutual reciprocity, as the Palestinian side does not appear to directly respond to Israeli countermeasures.¹⁴ Since there is no reciprocity or little evidence of deterrent effects on the Palestinian side, counterterrorist efforts were not able to limit escalation of the conflict. This pattern of reprisals runs counter to the conventional assumption that increased counterterrorism activity can only suppress future terrorist activity (Sandler et al., 1983; Rosendorff and Sandler, 2004).¹⁵ Furthermore, we find that during this time, the Palestinian groups pursued a relatively single-minded strategy – suicide attacks – as their response to Israeli counterattacks. In contrast to the temporal dynamics of suicide attacks, there is no significant correlation for non-suicide attacks (Figure 2b) over the same period ($r = -0.10, p > 0.5$), and the corresponding CCF shows no significant peaks at any lag.

Beginning in January 2004, however, changes in the frequency of suicide attacks and counterattacks become uncorrelated ($r = -0.21, p > 0.25$), with the corresponding CCF showing no significant peaks at any lag, illustrating an end to the tit-for-tat response pattern. Furthermore, the overall frequency of attacks shifted decisively between these two periods: the rate of suicide attacks dropped from 3.0 per month to only 1.1 per month, while the rate of counterattacks increased from 2.2 per month to 4.2 per month.

We also consider what relationship the severity of Palestinian attacks, i.e. the number of casualties, has with the Israeli counterattacks, as opposed to the number of incidents. During the initial period, we find a slightly weaker anti-correlation between changes in the severity of suicide attacks and the frequency of Israeli countermeasures ($r = -0.31, p < 0.1$), and that this relationship also disappears in the second period ($r = -0.23, p > 0.2$). Overall, this dynamic behaviour suggests that the Palestinian groups considered the severity of their response to Israeli counterattacks as being less important than responding proportionally in frequency. It could, however, also be the case that Palestinian groups simply have little control over the resulting severity of their attacks (see also Harrison, 2006).

Initially, these results are consistent with our expectations, given the theory of strategic substitution, i.e. the Palestinian groups shifted to non-suicide attacks because Israel's new strategy (beginning in 2004) made it more difficult for them to execute suicide attacks. Indeed, the official explanation given by official Israeli sources matches this story quite closely, and there is some causal empirical evidence to support these claims. In particular, during the second time period, Israel made significant progress in building the security fence while also relying on the targeted assassinations of bomb makers, attack coordinators and suicide bombers themselves in an effort to undermine the Palestinian groups' ability to conduct suicide attacks (Israeli Ministry of Foreign Affairs, 2006).

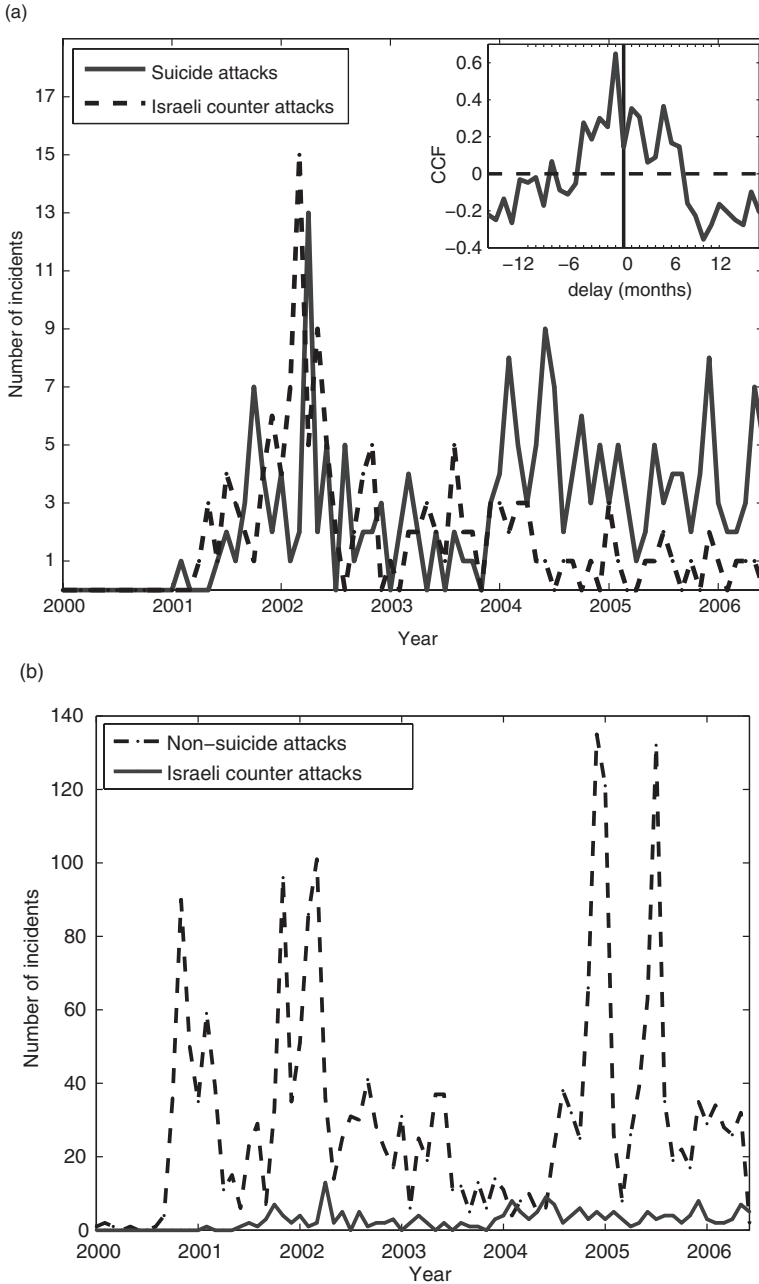


Figure 2. Incident counts for (a) suicide and (b) non-suicide attacks, and for Israeli counterterrorism events. Between 2001 and the end of 2003, Israel pursues a clear tit-for-tat strategy with the Palestinian groups (inset shows the cross-correlation function for this period, with a strong peak at $\tau = -1$ month delay, reflecting how Israeli attacks are most correlated with the prior month's suicide attack rate). Beginning in 2004, Israel pursues markedly different strategy, with its counter-terrorism attacks being largely independent of the incidence of suicide attacks

The remaining details of these statistical trends, however, are difficult to explain using only the conventional theory of strategic substitution, as such an argument implies that both the large number of suicide attacks during the first period (2001 through 2003) and the dramatic spikes in non-suicide attacks around the beginning of 2005 were the Palestinian groups' most cost-effective reaction to Israel's counter-terrorism policies at the time. One significant problem with this line of reasoning is the assumption that changes in strategies by the non-state actors are driven exclusively, in a causal manner, by the actions of the state. Although there are certainly examples when such entailment is important, e.g. the case of metal detectors studied by Enders and Sandler (1993), it seems unlikely that it is the most important factor in all situations. In the next two sections, we consider alternative explanations, outside the conventional theory of strategic substitution, for these statistical features of the Israel–Palestine conflict, and give empirical evidence suggesting that several other factors are at least as important in influencing the behaviour of the Palestinian groups as the actions of Israel.

Competition, imitation and the role of public opinion

To understand the first of the two statistical features, we now consider the use of suicide attacks by individual Palestinian groups. Bloom's (2004) analysis of the relationship between shifts in Palestinian public opinion and the incidence of violence in the conflict suggests that suicide attacks serve a dual purpose: they attack Israel by punishing and terrorizing Israeli citizens who, on account of Israel's policy of universal conscription, many Palestinians see as being complicit in the military engagement against Palestinians, and they raise the profile of the group responsible for the attack. Bloom's latter reasoning suggests that groups with low profiles or popularity problems could use suicide attacks to bolster their standing. If this hypothesis is correct, then we expect to see a relationship between a group's support among Palestinians and their use of suicide attacks.

We first consider the data for Fatah and Hamas: Figure 3 shows the Palestinian public approval rating of Fatah and Hamas between 1994 and 2006. Overlaid on these trends are the severities of the suicide attacks claimed by these two groups over the same period. Although both groups carried out a large number of attacks from 2001 to 2002, Hamas initiated its suicide campaign several months prior to Fatah. Additionally, Fatah's inaugural suicide attack was in February 2002 (or November 2001 if we include the first al-Aqsa Martyr Brigade attacks), yet suicide attacks had been used by other groups on the Palestinian side since Hamas pioneered the tactic in April 1994.

Fatah originally strongly condemned Hamas's use of suicide attacks. For example, Arafat in 1996 condemned Hamas and PIJ suicide attacks as 'illegal' and 'attacks against the Palestinians and the peace process', and emphasized that the Palestinian authorities would 'pursue our policy of fighting terrorism here and abroad ... [working] with the Israelis to destroy their infrastructure and to uproot terrorism'.¹⁶ During the first wave of suicide bombings in the second Intifada, Fatah continued to criticize the use of suicide attacks. For example, in response to the 2 June 2001 Hamas suicide attack on a nightclub in Tel Aviv, which killed 18 and wounded many others, Arafat insisted that 'we will ... exert the utmost efforts to stop the bloodshed of our people and of the Israeli people'.¹⁷ However, the coincidence of Fatah's low approval ratings in 2002 with its adoption of

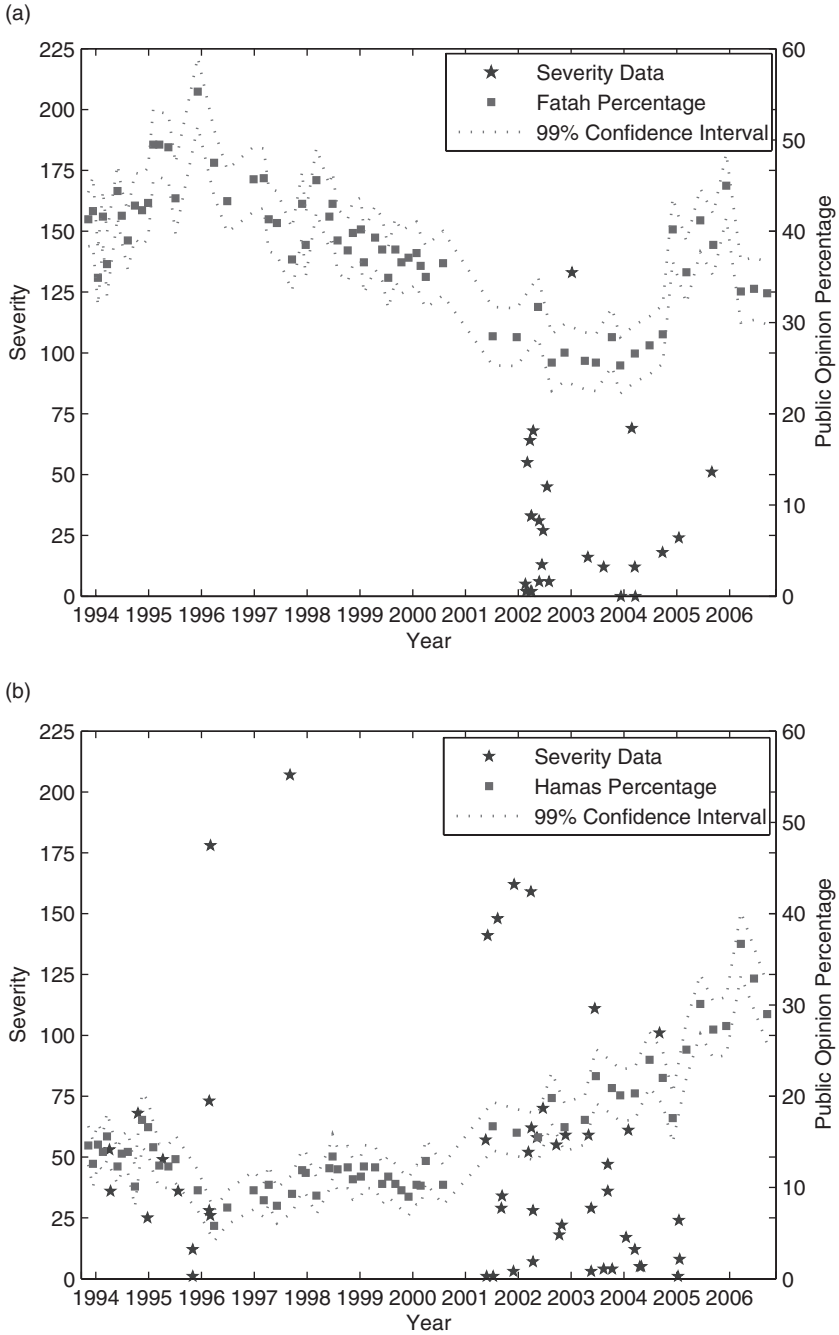


Figure 3. Suicide attack severity (shown as blue stars with severity given by the left axis) over time for (a) Fatah and (b) Hamas, overlaid on the public approval ratings for each of the groups (shown on the right axis)

the suicide tactic (Figure 3a) suggests that Bloom's hypothesis may be a reasonable explanation for Fatah's change in its behaviour here.¹⁸ That is, in the period following the signing of Oslo II and the beginning of the al-Aqsa Intifada – the period of roughly 1996 to 2000 – Fatah's public support consistently decreased, at a rate of about 2.5% per year, from 48% in 1996 to about 38% in 2000. Over this period, Fatah claimed no violent attacks. Beginning in 2002, however, this decline seemed to stabilize, and then reverse starting in roughly 2004 – a period that coincides precisely with Fatah carrying out a number of severe suicide attacks.

Over the same period, support for Hamas among the Palestinians increased only marginally, by about 1% per year, never exceeding the 15% approval rating of 1994. Yet, this marginal support persisted despite Hamas carrying out several extreme suicide attacks, such as the 4 March 1996 suicide bombing in Tel Aviv and the 4 September 1997 suicide bombings in Jerusalem, both with roughly 200 casualties (Figure 3b). Thus, Bloom's hypothesis seems inconsistent, or at least incomplete – why did public support for Hamas not increase after its first campaign of suicide attacks in the early-to-mid 1990s? To resolve this puzzle, we suggest a slight modification of Bloom's hypothesis: in order for a group to get a lift in approval by using a particular tactic, be it suicide or otherwise, the public must support its use. As a corollary, we expect that if the public supports the use of a particular violent tactic, a group that can successfully employ it against Israel will receive a lift in approval, provided it is seen as a viable contender. From this perspective, it should be no surprise that Hamas gained little support from its early attacks because public support for such attacks was not particularly high during this period, being roughly 30% between 1994 and 2000 (Jerusalem Media and Communication Centre, 2006).

With the beginning of the al-Aqsa Intifada, however, the situation had changed in several important ways. First, by 2001 Fatah's popularity had continued to erode, falling below 30%, while Hamas's had risen to almost 20%. Although both groups conducted low-severity campaigns of non-suicide attacks beginning in the second half of 2000, Hamas distinguished itself from Fatah early on by conducting seven suicide bombings in 2001. But, unlike the 1990s, these attacks now coincide with increases in public approval of Hamas. The corollary above suggests that this lift is due to Hamas carrying out attacks using a tactic the Palestinian people approved of, and, indeed, we find this to be the case: by the beginning of the Second Intifada, Palestinian approval of the suicide tactic had risen to more than 60% (Jerusalem Media and Communication Centre, 2006). Thus, Hamas's use of its suicide strategy in this more supportive environment would seem to explain its progressive increase in approval ratings.

Turning back to Fatah's behaviour, we note that Bloom's explanation of the effect of suicide attacks does not explain why Fatah chose to adopt the suicide tactic at the beginning of 2002, and not earlier or later. That is, what circumstances in early 2002 led Fatah to adopt a tactic with which it had no experience? We suggest that it was inter-group competition: Fatah chose to adopt the suicide attack in order to capitalize on public sentiment to mitigate its loss of public support and perhaps slow or halt Hamas's rising approval ratings. From this perspective, the nine-month delay between Hamas's and Fatah's first suicide attacks in this period may reflect a period of time in which Fatah was deciding whether Hamas posed a significant threat to its hegemony, and was developing the necessary expertise and human resources to conduct suicide operations.

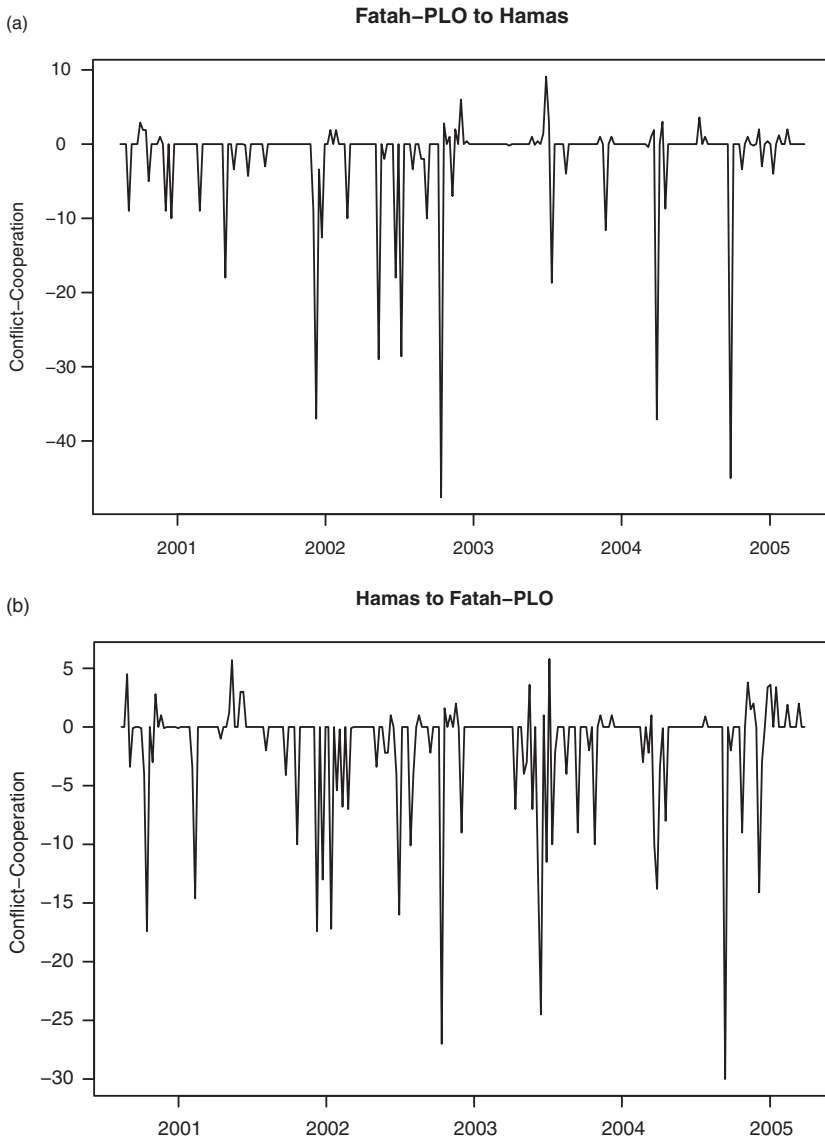


Figure 4. Conflict cooperation scores for directed behaviour of (a) Fatah to Hamas and (b) Hamas to Fatah, with events aggregated over weeks

A troubling alternative to this hypothesis is that the use of suicide attacks in 2002 by Hamas and Fatah was a coordinated, rather than competitive, effort. Using the conflict-cooperation scores generated from events in the Levant data (Figure 4; recall that negative scores indicate conflictual interactions), we find little evidence that Fatah and Hamas had anything but a largely competitive relationship in this time period. The average of the weekly conflict-cooperation scores is only slightly less negative, or slightly more cooperative, in the

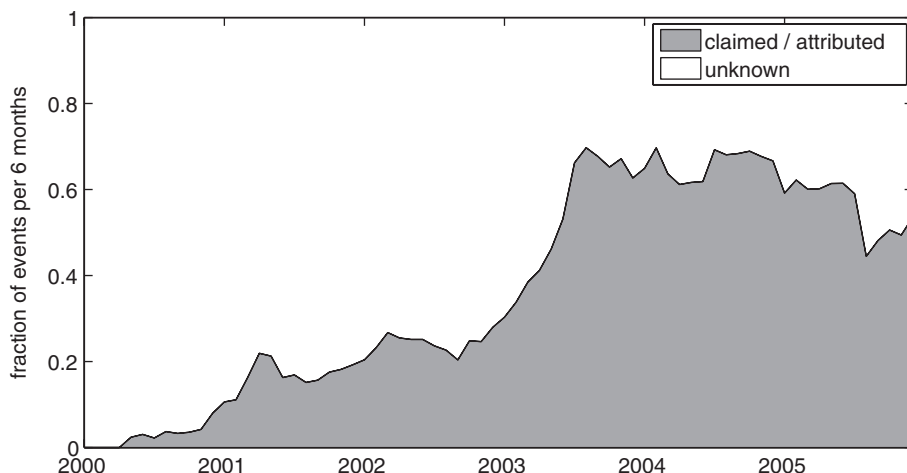


Figure 5. Proportion of events that were claimed or attributed to Fatah, PFLP, Hamas or PIJ versus those unclaimed (i.e. attributed to an Unknown or Other group), with events aggregated over a six-month sliding window

period prior to the first recorded suicide attack by the al-Aqsa Martyrs’ Brigade on 29 November 2001 (-0.928 in the case of Fatah-to-Hamas events, and -0.619 for events from Hamas-to-Fatah) than in the following period (-1.728 and -1.794 , respectively). Thus, if there was a change in the character of their relationship, it was not in the direction of increased cooperation, as the difference in the conflict-cooperation score has the wrong sign and is also statistically significant in the case of Hamas behaviour to Fatah ($p < 0.04$).

Further indirect support of the competitive hypothesis comes from considering whether attacks during this period are claimed or not. In a competitive environment, association with an event should improve that group’s public standing with the Palestinian people. Were Fatah and Hamas (and other groups) cooperating, such distinctions should not be necessary. Thus, if we construct a time series of the fraction of events that are claimed versus unclaimed, a competitive environment would be denoted by a large fraction of claimed events. Figure 5 shows this proportion for a sliding window of six months, which increases from virtually zero in early 2000 to almost 70% by the middle of 2003, where it largely remains through 2006.

Fatah and Hamas are not the only groups to employ suicide attacks, and an important test of Bloom’s hypothesis is to consider the effect of suicide attacks on the public standing of more marginal groups such as PFLP and PIJ. Although both carried out a number of severe suicide attacks during the 2002–2004 period, neither saw significant gains in public support (Figure 6), despite the public’s support for these tactics. Thus, Bloom’s hypothesis, even in the modified form suggested above, is not completely consistent with the empirical data – the use of suicide attacks cannot alone improve a group’s public standing, even when the public generally supports the use of these tactics.

One potential explanation of this inconsistency is that only a plausible challenger to a dominant organization, such as Hamas challenging Fatah, can enhance its public standing by engaging in particular forms of dramatic and high impact terrorism. In such a

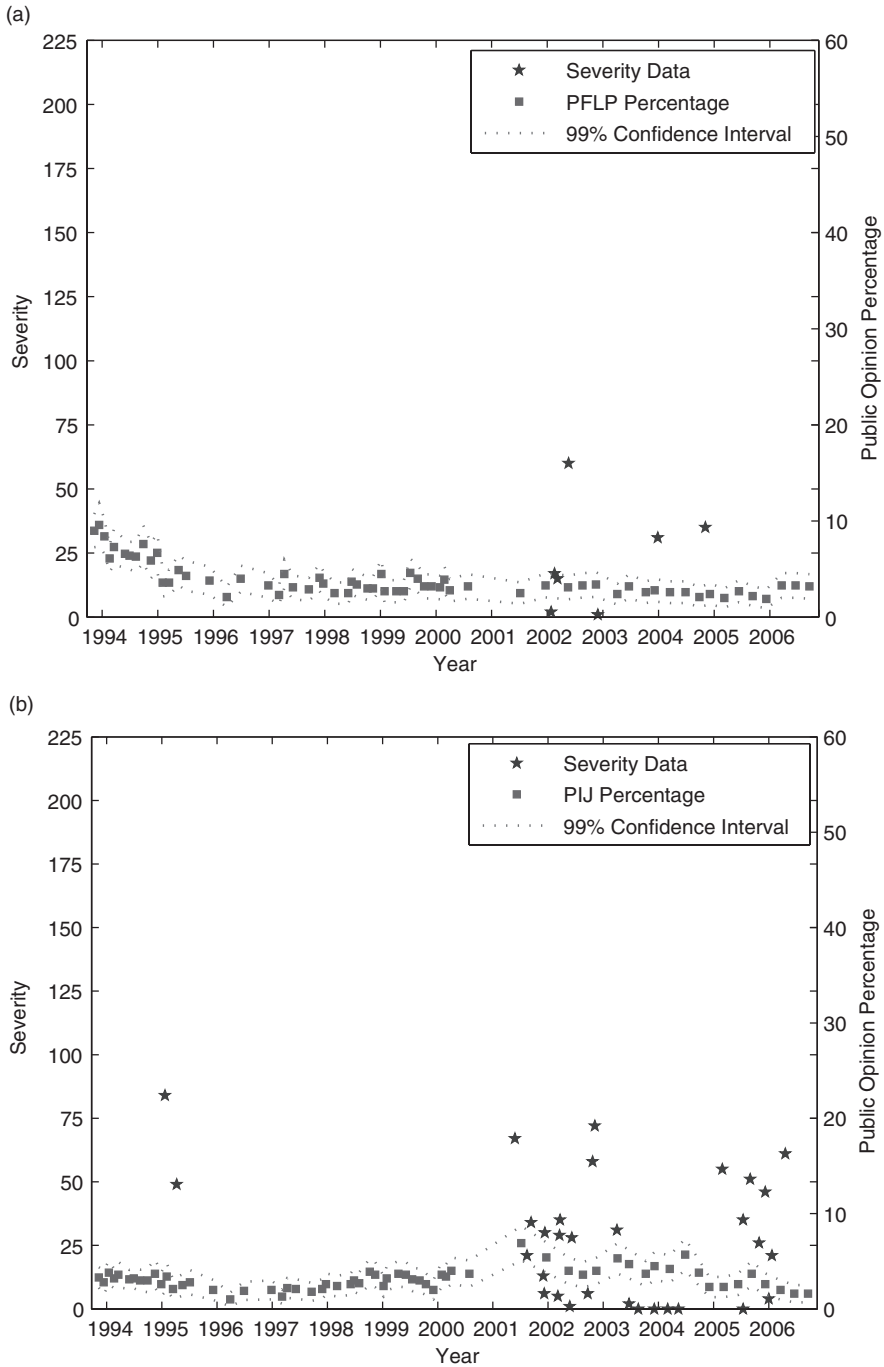


Figure 6. Suicide attack severity (left axis; blue stars) over time for (a) PFLP and (b) PIJ, overlaid on the public approval ratings for each groups along with those for Hamas and Fatah (right axis)

situation, the dominant organization is likely to try to contain the growing popularity of the challenger – and may have some success – by emulating the latter’s methods, thereby removing the apparent novelty or distinctiveness of the challengers’ strategy that resonated with the public. Less established and more obscure groups, however, do not necessarily gain similar benefits from resorting to a particular tactic, even if it is a popular one. More generally, the incentives for resorting to extreme terrorism may be very different for ‘large’ groups that are generally well known than for ‘small’ groups that the public is less familiar with, unless such small groups first manage to establish themselves in a position as a plausible challenger or central player. In the case of Hamas, its growth into a large organization seems due partly to its provision of public goods, something that the PIJ has never done. Thus, Hamas’s rise to power in Palestine may not have been caused by its use of suicide bombings; rather, its success as a large organization may have encouraged other groups to emulate its violent tactics.

Election-driven behaviour

We now turn to the second unexplained statistical feature in our analysis of attacks and countermeasures: the intermittent but distinctive spikes in the frequency of non-suicide attacks (Figure 2b), and, in particular, the two dramatic spikes in late 2004 and mid-2005, each with more than 100 events. Here, again, we suggest that internal politics on the Palestinian side – in particular, the first municipal and Presidential elections since 1996 – can explain the first of these spikes, while the second can be understood as a symbolic response by Hamas in the run-up to the Israeli evacuation of 25 Jewish settlements in Gaza and the West Bank.

During this period, Hamas was, by far, the most active of the major actors on the Palestinian side, and the statistics of the conflict are dominated by its attacks. Figure 7 shows the frequency of incidents (suicide and non-suicide; upper pane) and the average number of casualties per attack (lower) for Hamas from 2000 onward. To illustrate the relationship between these statistics and the Palestinian’s internal politics, we overlay these series with the dates of Palestinian elections (municipal, legislative and Presidential).¹⁹

From this combination, several patterns are clear. Most notably, Hamas abandons its use of suicide bombing shortly after the January 2005 Presidential election.²⁰ Furthermore, between 2001 and 2005, the average severity of these suicide attacks consistently decreases – suggesting that either Israel’s countermeasures (see above) were increasingly effective at curtailing the severity of these attacks or that Hamas deliberately attenuated its bombing campaign for other, possibly internal reasons.

The conventional theory of substitution would lead us to conclude that the large spike in non-suicide attacks from October through December 2004 must have been a direct consequence of Israel’s countermeasures making the cost versus benefit of suicide attacks relatively unfavourable compared to non-suicide attacks. This explanation, however, does not explain the peculiar timing of these events, which occurred precisely before the Palestinian Presidential election in January 2005, the first in almost 10 years. Given this coincidence, and the difficulty of directly testing the more conventional interpretation, a plausible alternative explanation for Hamas’s shift away from severe suicide attacks toward non-severe non-suicide attacks is internal Palestinian politics rather than external countermeasures.

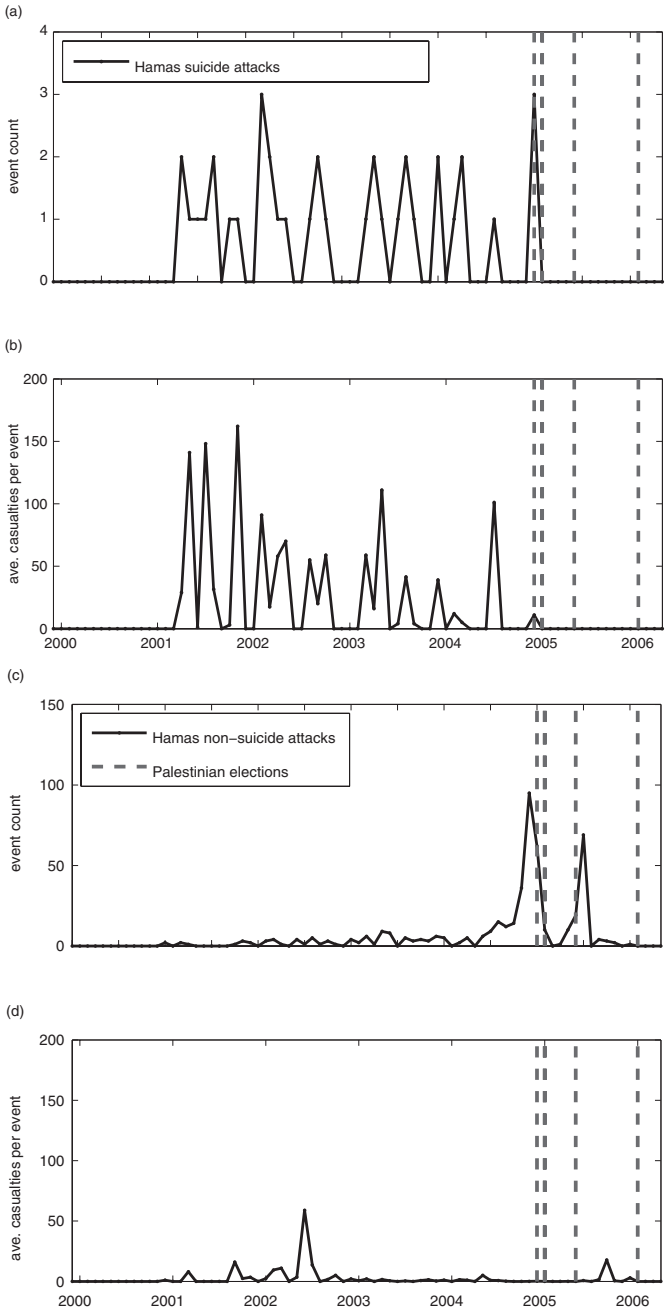


Figure 7. Hamas attacks and casualties, from January 2000 to June 2006: (a) incident frequency for suicide attacks; (b) average number of casualties per suicide attack; (c) incident frequency for non-suicide attacks; (d) average casualties per non-suicide attack. The vertical dashed lines indicate elections and the right-most line corresponds to the 2006 legislative elections

In addition to the Presidential election, three rounds of municipal elections (December 2004, January 2005 and May 2005) were also held in this timeframe. It is possible that Hamas's activities were driven by these smaller elections, as the dramatic activity around the New Year in 2005 also preceded two of the three elections. However, the lack of any activity preceding the last of the three elections supports our suggestion that the 2004 spike may have been driven by the upcoming Presidential election alone.

Politically, Hamas boycotted all four of these elections, and, it would seem, chose instead to use violence in a highly strategic way to independently demonstrate its political and military strength. Indeed, these actions may now be seen as part of a larger strategy in preparation for the 2006 legislative elections, which Hamas did not boycott. That is, finally achieving a competitive status with Fatah in late 2003, which we observe from the degree of support from the Palestinian people (Figure 3), Hamas may have believed itself now to be a viable electoral challenger to Fatah's dominance in the Palestinian Authority. From this point onward, Hamas seems to have shifted its strategic use of violence to prepare for precisely such a challenge at the legislative level, phasing out its use of suicide attacks – perhaps encouraged by effective Israeli countermeasures – and increasingly using non-lethal, non-severe attacks to demonstrate its military strength. Another consideration may have been Hamas's desire to continue to attack Israel, but without directly stimulating an Israeli retaliation that might undermine Palestinian support for Hamas in future elections.

In agreement with this interpretation, we note that in the vicinity of the legislative election in 2006 – the first that Hamas did not boycott – we see virtually no attacks by Hamas, neither suicide nor non-suicide.²¹ Another plausible factor influencing Hamas's behaviour in this timeframe is the incentive to signal its ability to control the use of violence to both the Palestinian and Israeli audiences. In prior time periods, the Palestinian Authority's peace negotiations with Israel were disrupted by suicide attacks. Kydd and Walter (2002) suggest that this behaviour implies that terrorism is used as a strategic 'spoiler', whereby attacks are used to violate Israel's trust in the Palestinian side's ability to control its extremist factions. Hamas's abandonment of suicide attacks may thus signal authority over its extremist factions and, more generally, its ability to control violence and engage in effective internal policing. This control could serve to increase Hamas's appeal as an effective political organization to both Palestinians and Israelis, demonstrating to Palestinians that it can guarantee security, while signalling to Israel that it will be negotiating with a party able to control the violence. Certainly in a political environment where multiple groups compete to coerce Israeli policies, demonstrating organizational control by freezing the use of a particular tactic, which may be the most effective (and, by extension, the most detrimental to Israeli interests), seems like a reasonably attractive strategy.

Finally, we observe that the second spike of non-lethal, non-suicide attacks, in mid-2005, was largely in response to Israel's planned evacuation of 25 settlements in the West Bank and Gaza. Hamas launched a large number of mortar and Qassam rocket attacks at about half of these settlements, as well as at a few that were not being evacuated, but largely inaccurately. In light of our previous discussion, this behaviour appears to be largely symbolic – again demonstrating Hamas's military strength, but not in a way that would stimulate a vigorous response from Israel, or halt the pull out.

Substitution and competition in terrorism

In the preceding sections, we gave several empirical examples from the Israel–Palestine conflict to illustrate the idea that the conventional notions of strategic substitution in terrorism (Enders and Sandler, 2004), which locate actions by the state as the central driving force, are insufficient in explaining the full strategic calculus of terrorism. In particular, the conventional theory ignores the internal dynamics of the Palestinian side. If these findings can be generalized, then we would expect to observe qualitatively similar behaviour in other regional conflicts with a heterogeneous mixture of actors to the extent that the specific political context and phase of the conflict allows. To make our findings more generally applicable, we now extrapolate our analysis of the Israel–Palestine conflict into a set of stylized conjectures about the features that we expect would be influential in the resort to terrorism, and the character of violence, for conflicts with multiple non-state actors. Here, we provide brief qualitative evaluation of these general principles and leave their more systematic or quantitative evaluation for the future.

First, we should consider whether relations between actors within each side of the conflict are primarily competitive or cooperative. In the former case, a resort to terrorism may be more likely, as less extreme groups face competition from more extreme factions over scarce resources such as public support, recruits, financing, media attention, and so on. Likewise, a competitive atmosphere may make negotiations between key antagonists difficult, as marginal groups on either side can undermine these actions through violence (à la the ‘spoiler’ effect of Kydd and Walter).

An important extension of this observation is that the cohesion within groups may also be vitally important. That is, if the internal factions of a group are cooperative, with non-conformists or extremists being contained or controlled, political negotiations are less likely to be derailed. On the other hand, when internal dissent dominates, marginalized factions can play the spoiler to political negotiations by the larger organization. For instance, in Northern Ireland, talks between British authorities, Unionists and Sinn Fein may have been undermined on numerous occasions because of the actions of IRA members who saw Sinn Fein’s participation in politics as an illegitimate extension of the Republican cause. In the Israel–Palestine conflict, Hamas’s ability to control its internal factions may have contributed to its electoral success. Whether Hamas can be a reliable negotiator for the Palestinian people, however, likely depends on the behaviour of other groups, such as Fatah, PLFP and PIJ, who could play spoiler to Hamas’s efforts.

Second, we should consider whether the political process engages or marginalizes the interests of significant extremist factions. That is, marginalizing such groups may provide them with an incentive to demonstrate their importance, and thus tacitly encourage them to employ violence. By contrast, cases where extremists are engaged in conventional and non-violent political processes, e.g. perhaps through elections, may reduce violence by providing groups with an incentive to demonstrate their ability to control violence.

However, for some groups, engagement in politics indicates a level of unacceptable acquiescence, or assent to the very system they currently oppose. These groups remain outside the main political arena, and may see violence as their only tactical option to

exert the degree of influence they desire. Although our study focuses on politically engaged violent groups, the significance of political involvement should not be overlooked. Groups that are engaged in the political process during a conflict may demonstrate very different characteristics than those that choose to remain outside the political arena. In Hamas's case, its behaviour prior to 2005 is similar to a violent but marginalized political group, while its behaviour since engaging in the conventional electoral process is considerably more moderate. Similarly, in the Irish conflict, attacks carried out after the IRA began pursuing its 'ballot paper in one hand and the armalite in the other' strategy, i.e. began supporting Sinn Fein's political role and a pan-nationalist alliance, have been described as more specific and less destructive. For example, Moloney (2002: 389) notes that:

The IRA's military strategy had to be tailored so that it would not offend the rest of nationalist Ireland. That meant the IRA had to concentrate on hitting targets in England and military targets in the North while avoiding civilian casualties of any sort in Ireland.

Third, we conjecture that the degree of alignment between public opinion and the ideology of the group(s) is inversely related to the frequency and severity of attacks. That is, when a group becomes accepted as representatives for a large number of constituents, it also has a greater incentive to engage in policing activity to prevent violent attacks that may stimulate counterproductive or overly harsh responses from the other side. Furthermore, because such groups are sensitive to public opinion, they will likely be more cautious in attacking targets that are considered illegitimate among potential or existing supporters.

Fourth, strategic innovation in terrorism may be partly due to competition with or imitation of other successful terrorist organizations. From this perspective, Fatah's adoption of Hamas's signature strategy in the wake of its declining public standing is likely an example of precisely this competition-induced innovation. Imitation is not limited to groups located in the same theatre; rather, groups may look to actors in other conflicts for inspiration, e.g. the IRA campaign against the British inspired Jewish settlers in Palestine to adopt similar tactics against the British, and the Irish Republican prisoners in the Long Kesh prison during the early 1980s spent a great deal of time learning and discussing the characteristics of other revolutionary struggles (McKeown, 2001). Similarly, the PFLP was initially inspired by the ideas of guerrilla warfare popularized by Che Guevara, and, in turn, their innovative use of aircraft hijacking in 1968 led to a surge of subsequent hijackings, including many by groups not connected with the Israel–Palestine conflict, such as Sikh separatists. Thus, strategic innovation in one conflict may have a 'non-local' effect in other conflicts, and it remains an open question as to what kind of innovations are, or are not, most likely to spread.

Finally, the severity of violent attacks, and probably also their timing relative to political events, should be considered a component of the strategic calculus of terrorism. Hamas's shift to non-severe, non-suicide attacks prior to the 2006 elections represents a tactical shift in the type of violence, but also a shift in the deadliness of its attacks. Although it is difficult to discern whether the change in severity and approach, or the combination of both, has led to the effect that Hamas desired, Hamas could likely have produced many

more casualties over the same time period if it had wanted. Indeed, groups such as ETA and the IRA have at times gone to great lengths to reduce the number of casualties caused by their attacks. For instance, on 27 July 2001, ETA called to warn Spanish authorities about a bomb in Malaga airport which certainly would have killed or injured many. The attention that groups pay to this aspect of their attacks indicates that the severity of attacks is a strategic consideration independent of their incidence, and we would suggest that it is likely to be subject to many of the factors we have introduced here.

Conclusions

At face value, the conventional theories of the strategic calculus of terrorism – such as strategic substitution, Bloom's ideas about the political utility of suicide attacks to organizations and the conventional assumption that counterterrorism activities can only decrease the likelihood of future attacks – seem entirely reasonable. However, they have mainly been explored in relatively narrow contexts, and thus their generality has not yet been established. The Israel–Palestine conflict, owing to its long and well-documented history and, more importantly, relatively plentiful empirical data, is thus a model conflict by which we can test hypotheses such as these. That being said, we consider our findings here to be preliminary; a comparative study that considered the statistics of many different conflicts would probably settle many of these questions and better identify the circumstances under which these conventional theories apply. Still, our analyses allow us to draw several cautionary conclusions.

First, the evidence supporting the conventional notion of strategic substitution (Landes, 1978; Enders and Sandler, 1993, 2004) as an explanation for changes in attack modes is not very strong in the Israel–Palestine conflict – among the data studied here, the only plausible explanation is in Israel's efforts from late 2003 and onward to reduce the number of suicide attacks by the Palestinian groups. From this perspective, the conventional theory is surely incomplete, with the critical missing piece being an explanation of when strategic substitution is a reasonable hypothesis and when it is not. Our finding that Palestinian groups behave in ways that are independent of Israel's actions, and in particular that they seem to be motivated at least as much by inter-group dynamics as by Israel's actions, suggests that the more general theory should likely account for whether the internal dynamics of the conflict are competitive or cooperative.

Second, we find that the conventional notion in counterterrorism that increased countermeasures can only reduce the frequency of future attacks (Sandler et al., 1983; Rosendorff and Sandler, 2004) is flawed. As evidenced by the tit-for-tat behaviour of Palestinian groups using suicide attacks during the Second Intifada (Figure 2a) some countermeasures can actually increase the frequency of future attacks, perhaps by implicitly engaging the terrorist organizations in a dominance competition. Thus, it seems that the choice of which counterterrorism actions to take must be made carefully, so as not to encourage such reciprocal behaviour. Furthermore, less common approaches, such as fostering a political path for violent organizations, may be highly successful ways to reduce the frequency of suicide attacks, and perhaps even other types of violence. Hamas's behaviour after the decision to hold legislative elections in 2006, for instance, demonstrates that such non-violent paths may be an effective means of tempering the

character of violence in a conflict. Hence, a more comprehensive approach to both active counterterrorism and other strategies like political incorporation that accounts for the internal dynamics influencing violent groups' activities is needed.

Third, the evidence for Bloom's (2004) notion that suicide attacks serve to raise the public standing of the attacking group is marginal. In the Israel–Palestine conflict, suicide attacks *per se* are sometimes associated with measurable improvements to a group's public standing (e.g. in the case of Fatah), but this is not the typical case. For Hamas in the early 1990s, and for the PFLP and the PIJ during the Second Intifada, the use of suicide attacks did not produce the predicted gains. Thus, Bloom's hypothesis is incomplete and marginal groups may employ suicide attacks for different reasons than larger and more established groups like Fatah and, since 2000, Hamas.

Fourth, a competitive environment among terrorism-inclined groups is a crucial factor in understanding, and likely forecasting, their strategic behaviour. For instance, a weakened mainstream group may adopt the tendencies of more extremist but marginal groups if it feels the public will support them for it; a situation that seems to describe Fatah's response to Hamas's growing popularity (Figure 3a).

Finally, our findings highlight the importance of the internal dynamics of the terrorism-inclined side of a conflict. For policy-makers, this point suggests that devising strategies to deal with one type of attack may prove fruitless if the internal dynamics of the opposing side shift for unanticipated reasons. But, without public support, terrorism-inclined groups often cease to exist. Thus, ideal protective measures should not aggravate existing internal tensions in a way that stimulates productive competition for public support.

In closing, we note that this study shows the utility in stepping away from the model-centric perspective on terrorism toward using a more data-centric approach to learn about complex conflicts with multiple actors. Although the specific political context and actors will undoubtedly vary across conflicts, we believe it is possible to formulate organizing principles about the dynamics of strategic substitution and competition in terrorism that can be applied to other conflicts.

Notes

1. This tendency may be due partly to the fact that much research on terrorism provides only highly aggregated statistics, such as the number of 'significant' events or the number of deaths worldwide from terrorist attacks, as given for example in the discontinued reports of the United States Department of State (2004).
2. More generally, Lichbach (1987) argues that repression can have ambiguous effects and lead to either successful deterrence or escalation, depending on the specific context and whether governments target non-violent and violent activities or provide other accommodative responses.
3. These groups drew inspiration from the Irish Republican Army, and their strategies were in turn emulated by others, such as the National Organization of Cypriot Fighters (EOKA).
4. The Second Intifada, also known as the al-Aqsa Intifada, followed in the wake of Israeli Prime Minister Ariel Sharon's controversial visit to the al-Aqsa mosque on the site of the Dome of the Rock to assert Israeli control.

5. The only study we are aware of examining the severity of attacks in the Israel–Palestine conflict is that of Harrison (2006), but this considers factors associated with more or less severe events (based on the assumption that terrorist groups always seek to maximize lethality) rather than the strategic rationale of attacks.
6. Since the initiation of this project, the original MIPT database has become defunct, and the data are no longer available online. Our understanding is that the MIPT data will eventually be merged with the Global Terrorism Database (GTD) managed by the START program, a US Department of Homeland Security Center of Excellence, at the University of Maryland, College Park.
7. There are several area-specific data collections, including collections by B'tselem (www.btselem.org/English/) and the International Policy Institute for Counter-Terrorism at the Interdisciplinary Center Herzliya (www.ict.org.il). We chose the MIPT dataset over these because using a global data source will allow future research to make comparisons more easily between the Israel–Palestine conflict and other conflicts using similar coding criteria.
8. We examine the named organizations in the MIPT data as the key actors, and assume that actions explicitly carried out or acknowledged by particular organizations can be treated as planned or at least endorsed by a central elite or leadership. Pedahzur and Perliger (2006) argue that many suicide attacks are planned by local activists, and that participation does not always follow clear organizational lines. However, focusing only on acknowledged or claimed events makes it less problematic to treat the organizations as individual actors. In the analyses reported, we do not include attacks by the al-Aqsa Martyrs' Brigade (AAMB) as attacks by Fatah. The AAMB is often linked to Fatah, but is not consistently endorsed by Fatah. Combining the AAMB and Fatah's attacks, however, does not noticeably alter the results reported here.
9. The Jerusalem Media and Communication Centre (2006) conducts similar polls. We find that an analysis of the JMCC data yields results consistent with that of the PSR data.
10. See <http://web.ku.edu/keds/data.dir/archives.html>.
11. We code actors in the Levant data by the following approach: We identify PLO/Fatah by the actor codes PSEGOVFTA, PALPLO, PSEGOV, PSEREBAAM, PSEELI, PSECOP (i.e. Palestinian government, PLO, Fatah, al-Aqsa Martyrs' Brigade, Palestinian elites and the Palestinian Police), while the events involving Hamas are labelled PSEREBHMS in the Levant data. The events recorded by KEDS will primarily reflect the statements of acts of elites, rather than individual rank and file members, but this is appropriate given our focus on organizations.
12. For more information, see the Ministry's anti-terror activity reports accessed 31 October 2006 at <http://tinyurl.com/qhalca>.
13. Throughout this article, we report two-tailed *p*-values from a standard *t*-test for the significance of the Pearson correlation *r* between series.
14. For a more detailed explanation of this pattern of reprisals in the Israel–Palestine conflict, see http://news.bbc.co.uk/2/hi/middle_east/3556809.stm. Jaeger and Paserman (2008) find similar results using different data on terrorist events.
15. Brym and Araj (2006) find support for retribution from Israeli actions as a motive for suicide attacks based on data on assassinations of Palestinian insurgents.
16. See The Independent, 4 March 1996, <http://tinyurl.com/qezlfr> and The New York Times, 5 March 1999, <http://tinyurl.com/pcyvro>.
17. See The New York Times, 3 June 2001, <http://tinyurl.com/pco7t>.

18. If we include al-Aqsa attacks, the first would be the 19 November 2001 Vadi Ara bombing as its first foray into suicide attacks. However, this attack was condemned by the Palestinian authorities (see Chicago Tribune, 21 November 2001, <http://tinyurl.com/on88eb>), which gives us reason to suspect that Fatah's leadership did not approve. However, our conclusions do not change if we use this earlier attack as the starting point.
19. A similar analysis using Israeli election dates suggests that Palestinian violence is not significantly driven by external politics, not at least in this period.
20. At the time of writing, the last documented suicide attack by Hamas was on 18 January 2005, near the Gush Katif settlement in the Gaza Strip (National Memorial Institute for the Prevention of Terrorism, 2006).
21. In fact, at the time of writing, since the mid-2005 spate of attacks, Hamas has not resorted to concentrated non-suicide attacks at any comparable level.

References

- Araj, B. (2008) 'Harsh State Repression as a Cause of Suicide Bombing: The Case of the Palestinian-Israeli Conflict', *Studies in Conflict & Terrorism* 31: 284–303.
- Bell, J. B. (1990) *IRA Tactics and Targets: An Analysis of Tactical Aspects of the Armed Struggle 1969–1989*. Dublin: Poolbeg Press Ltd.
- Bickerton, I. J. and Klausner, C. L. (2004) *A Concise History of the Arab-Israeli Conflict*, 4th edn. Englewood Cliffs, NJ: Prentice Hall.
- Bloom, M. M. (2004) 'Palestinian Suicide Bombing: Public Support, Market Share, and Outbidding', *Political Science Quarterly* 119: 61–88.
- Bogen, K. T. and Jones, E. D. (2006) 'Risks of Mortality and Morbidity from Worldwide Terrorism: 1968–2004', *Risk Analysis* 26: 45–59.
- Brym, R. J. and Araj, B. (2006) 'Suicide Bombing as Strategy and Interaction: The Case of the Second Intifada', *Social Forces* 84: 1969–86.
- Clauset, A., Young, M. and Gleditsch, K. S. (2007) 'On the Frequency of Severe Terrorist Attacks', *Journal of Conflict Resolution* 51: 55–88.
- Cunningham, D. E. (2006) 'Veto Players and Civil War Duration', *American Journal of Political Science* 50: 875–92.
- Eckstein, Z. and Tsiddon, D. (2004) 'Macroeconomic Consequences of Terror: Theory and the Case of Israel', *Journal of Monetary Economics* 51: 971–1002.
- Enders, W. and Sandler, T. (1993) 'The Effectiveness of Antiterrorism Policies: A Vector–Autoregression–Intervention Analysis', *American Political Science Review* 87: 829–44.
- Enders, W. and Sandler, T. (2004) 'What Do We Know About the Substitution Effect in Transnational Terrorism?' in A. Silke (ed.) *Research on Terrorism: Trends, Achievements, and Failures*. London: Frank Cass.
- Ganor, B. (2008) 'Terrorist Organization Typologies and the Probability of a Boomerang Effect', *Studies in Conflict & Terrorism* 31: 269–83.
- Gerner, D. J. (1994) *One Land, Two Peoples: The Conflict Over Palestine*, 2nd edn. Boulder, CO: Westview.
- Global Terrorism Database (2009) START. Available at <http://www.start.umd.edu/gtd/> (accessed various dates 2009).

- Goldstein, J. S. (1992) 'A Conflict–Cooperation Scale for WEIS Events Data', *Journal of Conflict Resolution* 36: 369–85.
- Goldstein, J. S., Pevehouse, J. C., Gerner, D. J. and Telhami, S. (2001) 'Reciprocity, Triangularity, and Cooperation in the Middle East, 1979–97', *Journal of Conflict Resolution* 5: 594–620.
- Harrison, M. (2006) 'Bombers and Bystanders in Suicide Attacks in Israel, 2000 to 2003', *Studies in Conflict and Terrorism* 29: 187–206.
- Israeli Ministry of Foreign Affairs (2006) Available at: <http://www.mfa.gov.il/mfa>; accessed December 2006.
- Jaeger, D. A. and Paserman, M. D. (2008) 'The Cycle of Violence? An Empirical Analysis of Fatalities in the Palestinian–Israeli Conflict', *American Economic Review* 98: 1591–604.
- Jerusalem Media and Communication Centre (2006) 'Palestinian Opinion Pulse'. Available at: <http://www.jmcc.org> (accessed December 2006).
- Kimmerling, B. and Migdal, J. S. (2003) *The Palestinian People: A History*. Cambridge, MA: Harvard University Press.
- Kydd, A. and Walter, B. (2002) 'Sabotaging the Peace: The Politics of Extremist Violence', *International Organization* 56: 263–96.
- Landes, W. M. (1978) 'An Economic Study of US Aircraft Skyjackings, 1961–1976', *Journal of Law and Economics* 21: 1–31.
- Lichbach, M. I. (1987) 'Deterrence or Escalation? The Puzzle of Aggregate Studies of Repression and Dissent', *Journal of Conflict Resolution* 31: 266–97.
- McKeown, L. (2001) *Out of Time: Irish Republican Prisoners Long Kesh 1972–2000*. Belfast: Beyond the Pale Publications.
- Mickolus, E., Sandler, T., Murdock, J. and Fleming, P. (2004) 'International Terrorism: Attributes of Terrorist Events 1968–2003 (ITERATE)'. Dunn Loring, VA: Vinyard Software.
- Moloney, E. (2002) *A Secret History of the IRA*. New York: W. W. Norton.
- Mueller, J. (2006) *Overblown: How Politicians and the Terrorism Industry Inflate National Security Threats, and Why We Believe Them*. New York: Free Press.
- National Memorial Institute for the Prevention of Terrorism (2006) 'Terrorism Knowledge Base'. Available at: <http://www.tkb.org> (accessed 18 June 2006).
- Palestinian Center for Policy and Survey Research (2007) 'Palestinian Public Opinion Polls'. Available at: <http://www.pcpsr.org> (accessed March 2007).
- Pape, R. A. (2003) 'The Strategic Logic of Suicide Terrorism', *American Political Science Review* 97: 343–61.
- Pedahzur, A. and Perliger, A. (2006) 'The Changing Nature of Suicide Attacks: A Social Network Perspective', *Social Forces* 84: 1987–2008.
- Rosendorff, B. P. and Sandler, T. (2004) 'Too Much of a Good Thing? The Proactive Response Dilemma', *Journal of Conflict Resolution* 48: 657–71.
- Sandler, T., Tschirhart, J. and Cauley, J. (1983) 'A Theoretical Analysis of Transnational Terrorism', *American Political Science Review* 77: 36–54.
- Schrodt, P. A. and Gerner, D. J. (1994) 'Validity Assessment of a Machine-Coded Event Data Set for the Middle East, 1982–92', *American Journal of Political Science* 38: 825–54.
- United States Department of State (2004) *Patterns of Global Terrorism, 2003*. Washington, DC: US Department of State.

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