Quarterly Journal of Political Science, 2009, 4: 315–342

The Shape of Things to Come? On the Dynamics of Suicide Attacks and Targeted Killings*

David A. Jaeger[1] and M. Daniele Paserman[2]

[1]*City University of New York Graduate Center, University of Cologne, and IZA; Email: djaeger@gc.cuny.edu*
[2]*Boston University, Hebrew University, NBER, CEPR, and IZA; Email: paserman@bu.edu*

ABSTRACT

In this paper we examine the dynamics of suicide attacks and targeted killings in the Second Intifada. We find evidence that the targeted killings of Palestinian leaders by Israel reduce *realized* Palestinian violence. We find, however, that *intended* Palestinian violence is increasing at low levels of targeted killings, but decreasing at higher levels. We find that suicide bombings that kill at least one Israeli lead to a subsequent increase in the incidence and levels of Palestinian fatalities. Our results do not support the notion that suicide attacks and targeted killings follow the "tit-for-tat" pattern that is commonly postulated in the literature.

Keywords: Suicide terrorism; Targeted killings; Assassinations; Second Intifada; Palestinians; Israel.

* We thank Tatiana Slobodnitsky, Tamar Roth, Yaron Aronshtam, and Eran Ben-Ari for their outstanding research assistance, Suhair Abdi and Yael Handelsman of B'Tselem for discussions about data as well as providing data on suicide bombings, Maj. Gen. (ret.) Netzach Mashiach for providing us the data on the separation barrier, and Noam Zussman for providing us the data on assassination attempts. We also thank Paul Manna and seminar participants at the University of Aarhus for their useful comments. David Jaeger acknowledges financial support from the IZA and the Samuel

Supplementary Material available from:
http://dx.doi.org/10.1561/100.00009013_supp
MS submitted 19 February 2009; *final version received 20 November 2009*
ISSN 1554-0626; DOI 10.1561/100.00009013

Unlike a conventional war involving ground or air combat on a battlefield between nation-states with armies of (roughly) equal capacity fighting to claim territory, several recent conflicts have taken place in populated civilian areas between groups with substantial differences in military capacity. These conflicts may include targeted killings (assassinations) of specific leaders on one side and suicide attacks on other – policies primarily designed to incapacitate or demoralize the opponent rather than to directly claim territory. In both cases, civilians are either deliberately targeted (as with suicide attacks) or are likely to be killed in the process (as with targeted killings). This kind of decentralized, somewhat sporadic, and clearly psychologically oriented warfare may be one of the defining characteristics of many of the conflicts of the twenty-first century.

In the long-standing conflict between the Palestinians and Israel, the Second Intifada has been characterized by the increased use of suicide attacks by the Palestinians and an increased number of Israeli targeted killings of Palestinian militants of all ranks. Nearly half of the over 1,000 Israeli fatalities in the Second Intifada have been caused by suicide attacks, while about 8% of more than 4,900 Palestinian fatalities have occurred during targeted killings. Of these, nearly 40% were not the targeted individual(s).[1] While neither of these tactics was introduced during the Second Intifada, their heightened prevalence has resulted in their being perceived as the defining characteristics of the conflict.[2]

The Palestinian–Israeli conflict, while perhaps the best known, is not the only one in which suicide attacks and targeted killings have been used. Hezbollah engaged in suicide attacks against Israeli, French, and U.S. targets in Lebanon between 1982 and 1985, while Israel also engaged in targeted killings of Hezbollah leaders. More recently, both before and after the suicide attacks of 11 September 2001, the United States has attempted targeted killings of al-Qaeda leaders in Afghanistan, Pakistan, Sudan, and Yemen, as well as Uday and Qusai Hussein in Iraq, despite laws prohibiting assassinations.[3] Russia has also been accused of assassinating several Chechen nationalist leaders.[4] At the same time, Chechen separatists have engaged in numerous suicide attacks against Russian targets,

---

Neaman Institute. Daniele Paserman acknowledges financial support from the Samuel Neaman Institute.

1 These statistics are taken from <http:/www.btselem.org> (last seen 9 February 2009) and are current through 26 December 2008 (before the Israeli offensive against Hamas in the Gaza Strip in December 2008/January 2009).

2 Israel has engaged in assassinations of Palestinians since the 1970s (Byman, 2006). There were more than 10 suicide attacks by Hamas and Islamic Jihad before the onset of the Second Intifada (Pape, 2005).

3 Section 5(g) of Executive Order 11905 provided that "No employee of the United States Government shall engage in, or conspire to engage in political assassination," and was signed by President Gerald Ford on 19 February 1976. It was superseded by Executive Order 12036, Sections 2-305 and 2-309 which prohibited direct and indirect participation in assassinations, respectively, signed by President Jimmy Carter on 26 January 1976. Executive Order 12333, Sections 2.1 and 2.2, signed by President Ronald Reagan on 4 December 1981 is still in effect and also prohibits direct and indirect participation in assassination (removing the word "political" from the 1976 Executive Order). In none of the orders, however, is "assassination" defined. See Kaplan (2006) for a discussion of U.S. targeted killings policy.

4 Specifically, Dzhokhar Dudayev, on 21 April 1996; Zelimkhan Yanderbiyev, on 13 February 2004 in Qatar; Aslan Maskhadov, on 8 March 2005; and Shamil Basayev, on 10 July 2006.

and have stood out for the high proportion of women among the attackers. While the frequency of targeted killings and suicide attacks in the Palestinian–Israeli conflict is much higher than in these conflicts, it shares certain similarities with them. In particular, they all involve an occupying army and a militant opposition that wants the occupiers to leave, a feature that, according to Pape (2005) is the main driving force behind suicide terrorism. Understanding the relationship between these two forms of violence in the Palestinian–Israeli conflict may shed light on their effects in other conflicts as well.[5]

In this paper we use data on violence and attempted violence in Israel and the Occupied Territories to examine the short-term dynamics of the two "signature" policies of the Second Intifada. Our primary interest is to estimate empirically whether suicide attacks generate a violent Israeli response and whether targeted killings lead to changes in Palestinian violent behavior, testing directly Bloom's (2004) assertion that the Palestinians and Israeli's are engaged in a perpetual causal tit-for-tat cycle of suicide attacks and targeted killing reprisals.

Our results suggest that Israel reacts to suicide attacks in the short run, with the number and incidence of Palestinian fatalities rising after a fatal suicide attack. This is true both for the overall number of Palestinian fatalities, and for the number of Palestinian fatalities in targeted killings. On the other hand, targeted killings of Palestinian leaders have a short-term deterrent or incapacitation effect: the overall number of Israeli fatalities and the number of Israelis killed in suicide attacks fall in the first week after a targeted killing. Strikingly, it is the number of Israeli fatalities caused by Palestinian attackers originating in the district where the targeted killing occurred that diminishes most, suggesting that the result is due to a true incapacitation effect. We also find some evidence that *intended* Palestinian suicide attacks (i.e., attacks in which Israelis were killed plus those in which there were no Israeli fatalities) increase following successful targeted killings (i.e., those in which the target was killed), although this response is non-linear: intended Palestinian violence increases when one moves from zero to one or two targeted killings per month, but then decreases at higher levels.

This paper extends our previous work (Jaeger and Paserman, 2006a, 2008) and adds several important new features to the analysis. A distinctive feature of all of our research on the Second Intifada is that we treat both sides of the conflict symmetrically, in contrast to much of the literature that focuses on the consequences of violence on only one side of the conflict. Symmetric treatment of both suicide attacks and targeted killings allows us to examine the full dynamics of the relationship between them and to assess their strategic effectiveness. In Jaeger and Paserman (2008) we examined the dynamics of the overall level of *realized* violence between the two sides and found that Israel reacts in a systematic way toward realized Palestinian violence, with little evidence of a systematic reaction by the Palestinians toward realized Israeli violence. We have also shown (Jaeger and Paserman, 2006a) that Israel reacts differently to attacks carried out by different Palestinian organizations.

---

[5] Stein (2003) has argued that Israeli assassinations are also illegal according to international law, as well as being immoral. Our goal in this paper is not to address the legality or morality of Israeli targeted killings, but to evaluate their effectiveness with regard to preventing future Israeli fatalities.

In contrast to these analyses, which looked at all types of lethal violence at a geographically aggregate level, in this paper we examine only suicide attacks and targeted killings and disaggregate by location. Suicide attacks and targeted killings represent very clear strategic decisions by the Palestinians and Israelis, respectively, allowing us to abstract from "conventional" combat fatalities. Moreover, we move beyond using only realized fatalities as our measure of violence and specifically examine both *successful* and *unsuccessful* attacks. As we discuss below, the randomness associated with whether a particular attack results in fatalities or not aids our identification strategy. The distinction between unsuccessful and successful Palestinian suicide attacks also allows us to examine more fully Israel's motivations for responding violently to the Palestinians. Responding only to fatal Palestinian attacks indicates that revenge, and not solely strategic considerations, may be an important component of the Israeli motivation for violent behavior. Lastly, by incorporating geographic variation in the location of attacks and the origin of the attacker into the analysis, we can better assess whether the decrease in Israeli fatalities following the targeted killing of Palestinian militants is due to a true incapacitation effect or is simply a result of increased Israeli vigilance.

PREVIOUS LITERATURE

There is a growing literature on the motivations and causes driving suicide terrorism. Pape (2003, 2005) asserts that suicide terrorism has a strategic value vis-à-vis the terrorists' opponent. After documenting the global pattern of suicide terrorism beginning in the 1980s, he concludes that it is used primarily to coerce democracies (like Israel) to relinquish occupied territory. He uses descriptive evidence to conclude that neither military offensives like targeted killings nor bargaining concessions are likely to quell suicide terror and that the best strategy for doing so is preventive measures like barriers. While Ashworth *et al.* (2008) have challenged Pape's conclusions, there is no question that his work has been very influential among academic researchers and policy makers alike.[6]

Bloom (2004), in contrast, asserts that Palestinian suicide terrorism is driven primarily by a desire by the competing factions to win the support of the Palestinian public by responding to Israeli attacks. She asserts that Israeli targeted killings are "seemingly irrational… only generat[ing] more victims," and concludes that "the Israelis and Palestinians appear to be in a deadlocked battle of assassinations-suicide bombing-assassination-suicide bombing in an unending causal loop" (pp. 83–84). This is, of course, an empirical question, which we will directly test below.

---

[6] As of July 2009, Pape's 2003 article has 72 citations in the Social Science Citation Index, and more than 300 citations in Google Scholar. Ashworth *et al.* (2008) claim, however, that Pape's empirical methodology is flawed because of sampling on the dependent variable, and that Pape's research design "cannot even reveal the relevant statistical associations between the use of suicide terror and its possible correlates." (*ibid.*, p. 269). Pape (2008) responds to these criticisms.

Like Bloom, Kydd and Walter (2002) suggest that suicide bombings serve another "internal" purpose, namely to derail peace processes near their potential conclusions, denying the desires of more moderate groups. They examine the pattern of Hamas attacks in Israel between 1993 and 2001 and conclude that their timing influenced the Israeli election of 1996, which led to the Likud Party and Benjamin Netanyahu coming to power; similarly, shortly after the outbreak of the Second Intifada, Likud Party leader Ariel Sharon defeated the more moderate Ehud Barak (head of the Labor Party) in the February 2001 direct elections for Israeli Prime Minister. In both cases, peace negotiations broke down after Likud took power. Bueno de Mesquita and Dickson (2007) make a somewhat similar argument, hypothesizing that extremist groups may attack the central government in the attempt to provoke a counterterrorism response that will radicalize the population, at the expense of support for a more moderate faction.

An alternative model for the interaction of terrorism and electoral outcomes specific to the Israeli context is presented in Berrebi and Klor (2006). They find that terrorism raises support for the right-wing party, but is more prevalent in periods when the left-wing party is in office. Gupta and Mundra (2005) attempt to test some of these hypotheses by examining low-frequency (bi-yearly) data on suicide attacks carried out by Hamas and Islamic Jihad between 1991 and 2003. They find that there is a degree of political strategic interplay between the two factions, and that acts of political provocation by Israel are important determinants of suicide attacks.

The literature on antiterror measures, and targeted killings in particular, has also grown in recent years. Enders and Sandler (1993) examine the effectiveness of antiterrorism policies in the context of transnational terrorism while examining whether different modalities of terrorist activity are substitutes or complements for one another. They find that most interventions have little effect on the overall level of terrorist activities. Brophy-Baermann and Conybeare (1994) build a theoretical rational expectations model, which suggests that the optimal rate of retaliation to terror is one that is rule-based rather than discretionary. They test this theory on data on terrorist attacks and retaliation in Israel between 1968 and 1989 and find that, in general, Israel's retaliations had little effect on the steady-state level of terrorist attacks.

More specific to the Second Intifada, Jacobson and Kaplan (2007) develop a sequential game–theoretic model of suicide bombings and targeted killings, where the decision by both Israel and the Palestinians to order targeted killings or suicide bombings is the result of a forward looking cost–benefit analysis. They use numerical methods to simulate the equilibrium level of violence under various assumptions on the patience (or, alternatively, discount rates) of the two sides. Their key finding is that, depending on the degree of impatience of the two sides, one can reach either a stable tit-for-tat equilibrium with a relatively constant level of violence on both sides, or an equilibrium characterized by outbursts of intense violence followed by periods of calm. David (2002) discusses Israel's policy of targeted killings and asserts, although he does not show empirically, that the net effect of targeted killings is the likely increase in Palestinian violence against Israelis. He nevertheless claims that targeted killings can be morally justified on deterrence, revenge, and retribution grounds.

Frisch (2006) presents descriptive evidence that Israel's counter-terror policies have reduced suicide bombings and other forms of violence. A more rigorous statistical approach is used by Kaplan *et al.* (2005), who proposed a "terror stock" model and examined how targeted killings and pre-emptive arrests influence the subsequent recruitment of terror operatives. They find that targeted killings of Palestinians serve to increase, while pre-emptive arrests reduce the stock of potential terrorists. Kaplan *et al.* (2006) allow for a more flexible functional form, but find largely similar results. Zussman and Zussman (2006) empirically estimate the effect of targeted killings on investors' sentiments about the Israeli economy. They find that the killing of senior Palestinian military leaders leads to an increase in Israeli stock prices while the killing of a senior Palestinian political leader has an opposite (and larger) effect.

In contrast to this previous research, we examine *directly* how targeted killings and suicide attacks affect the violent responses of Israel and the Palestinians, respectively. We aim to shed light on the motives and the strategic logic of suicide terrorism, as well as on the effectiveness of the counterterrorism measures adopted by Israel during the Second Intifada. We defer further discussion of these points to the concluding section.

MOTIVATION

Both suicide attacks and targeted killings are designed to induce fear in the opposite side and to provoke them to take a future course of action that is more desirable for the offensive side. Both actions also carry the objective of delivering retribution for past violence. Suicide attacks by Palestinians may serve a number of strategic goals (inducing Israel to make territorial concessions, derailing the peace process, improving the popularity of the faction responsible in the eyes of the Palestinian public, etc.), but they are also likely to prompt an Israeli response. Targeted killings of Palestinian militants have the objective of incapacitation by the deliberate destruction of human capital.[7] They may, however, also boost the desire for vengeance among the Palestinians, facilitating the recruitment of potential suicide bombers, and therefore increase the level of violence against Israeli targets. All of these factors suggest that whether targeted killings and suicide attacks raise or lower the level of violence is ultimately an empirical question.

Our empirical strategy assumes the existence of reaction functions for both sides of the form, without loss of generality,

$$R_t = f(I_{t-1}, P_{t-1}, \mathbf{X}_t), \tag{1}$$

where R_t is the realized or intended reaction, (e.g., for the Israeli reaction, R_t indicates Palestinian fatalities or targeted killings; for the Palestinian reaction, R_t indicates Israeli fatalities or suicide attacks), I_{t-1} is Israeli fatalities (either overall or caused by suicide attacks), P_{t-1} is Palestinian fatalities (either overall or targeted killings), and $\mathbf{X}_t$ is a

[7] The importance of human capital in the production of suicide terrorism is discussed in Benmelech and Berrebi (2007).

vector of other covariates (e.g., different periods in the conflict). We present results below that include more than one lag, and our estimates give us the net effect of the different motives discussed above. The robustness of the results to the inclusion of multiple lags is quite important, because it helps to assess whether the two sides strategically choose not only the intensity of the response to violence by the other side, but also its timing.

Our approach in this paper has a number of distinct advantages. First, we limit our focus to suicide attacks and targeted killings, two actions that are designed specifically to inflict fatalities on the other side, abstracting from more conventional "combat" fatalities, which are possibly incurred in defensive actions. Second, for both types of events we can identify in the data both successful and unsuccessful attempts. This allows us to glean some information on how the two sides react not only to *realized* levels of violence, but also to *intended* violence. Third, both the timing and the success of a suicide attack or an assassination attempt depend to a large extent on random factors: Will the target be killed? How many collateral fatalities will there be? Will the explosive belt detonate? How many individuals happen to be in the café when the bomb goes off? This randomness partially lends support to the causal interpretation of our results. We present a more comprehensive discussion of identification issues in the section on empirical results.

We should sound here two notes of caution. First, our analysis by necessity examines the *short-term* dynamics of suicide bombings and targeted killings. Despite the length of the Second Intifada, when using weekly data we only have a limited number of observations on which to base our estimation. While we can of course speculate on the effects of targeted killings and suicide bombings on Palestinian and Israeli behaviors, respectively, over the entire length of the conflict (and beyond), such "longer-term" effects cannot be estimated econometrically. Secondly, the goal of our analysis is to provide a *systematic* account of the dynamic link between Israeli and Palestinian violence. As such, it necessarily must refrain from investigating the effects of single episodes of violence. While analysis based on case studies or anecdotes can be useful for understanding the causes and effects of specific incidents, our approach allows us to estimate the average effect of targeted killings and suicide bombings on the dynamic of violence over the whole course of the Second Intifada and is useful for understanding the overall dynamics of the conflict.

DATA

Overall Fatalities

Our data on fatalities on both the Palestinian and Israeli sides are taken from the Website of B'Tselem, an Israeli human rights organization.[8] In its statistics section, the site records in detail every fatality (excluding suicide bombers) during the Second Intifada. The data include information on the date and circumstances (including suicide attacks and targeted killings) of the fatal wounding, the date of death (most often the day of

[8] <http://www.btselem.org>.

the fatal wounding), the age, gender, and locality of residence of the victim. Among the advantages of this dataset are its comprehensiveness and the symmetrical treatment of fatalities on both sides, something that is unavailable in neither the official statistics compiled by the Israeli Ministry of Foreign Affairs or the Palestinian National Information Centre, nor in the unofficial statistics compiled by the Palestinian Red Crescent Society. The information published by B'Tselem is widely thought to be accurate and reliable. We use data from 20 September 2000 to 15 January 2005, the day on which Mahmoud Abbas assumed the presidency of the Palestinian Authority following the death of Yasser Arafat. This period marks the peak of the Second Intifada and of the Palestinians' use of suicide bombings as their primary means of violence.

Targeted Killings

In addition to the information on targeted killings resulting in a fatality (although not necessarily that of the target) available in the B'Tselem data, we also employ the data compiled by Zussman and Zussman (2006) on targeted killings, which they generously shared with us. Contrary to the B'Tselem data, the Zussman and Zussman dataset also includes information on targeted killing attempts that did not result in any fatalities. Using data from four different sources (both Israeli and Palestinian), these authors compiled a list of all targeted killings carried out by Israel from September 2000 to 30 April 2004, a shorter time period than the one available from B'Tselem. The data record the date and circumstances of each assassination attempt, the identity and the organizational affiliation of the target, whether the target was killed, and the total number of fatalities caused by the assassination attempt. We define an attempt as successful if the target is killed.

Zussman and Zussman's definition of a targeted killing is somewhat broader than that employed by B'Tselem, although the targeted killings identified by B'Tselem are not a strict subset of those identified by Zussman and Zussman. In our primary analysis we use all of the (fatal) targeted killings identified in the B'Tselem data and supplement those with the additional non-fatal targeted killings identified by Zussman and Zussman.[9]

Suicide Bombings and Intended Palestinian Violence

One concern in our analysis is that realized Palestinian violence (i.e., violence that results in an Israeli fatality) may not fully capture Palestinian actions, particularly if Israel endogenously adjusts its preventive measures in response or anticipation of Palestinian actions (which may themselves occur in response to targeted killings). We therefore employ two measures of *intended* Palestinian violence. We use the data on fatalities from B'Tselem to identify individuals who were killed via a suicide attack. We supplement these data with information on unsuccessful (i.e., non-fatal) suicide attacks from an unpublished list of 114 fatal and non-fatal suicide attacks compiled by B'Tselem and

[9] Our analyses using targeted killings therefore cover the period 29 September 2000 to 30 April 2004.

graciously provided to us. We measure intended violence as the sum of fatal and non-fatal suicide attacks. The second measure of intended violence comes from data collected by the Israeli Defense Force (IDF). The IDF has collected data on the total number of successful and of prevented suicide attacks from the beginning of the Intifada until the end of 2004. Prevented attacks include those that were either thwarted by a preventive action by the IDF or the General Security Service, or were not carried out because of "work accidents" or other failures in the execution of the attack. These data are publicly available on a monthly frequency from the IDF Website. Unfortunately, higher frequency data on successful and unsuccessful attacks are not made available to the public for security reasons.

Other Measures

We include indicators for seven distinct phases in the conflict, from the outbreak of violence in September 2000 until 15 January 2005, when Mahmoud Abbas assumed the presidency of the Palestinian Authority two months after the death of Yasser Arafat. These phases are characterized by differences in the intensity and the character of the overall level of violence between the Palestinians and Israel. See Jaeger and Paserman (2006b) for a description of the different phases of the conflict. We should note, however, that our results are not sensitive to the inclusion or exclusion of these indicators.

We also include a measure of the length of the separation barrier between Israel and the West Bank Territories in our analysis. This measure is constructed from information on the length, location, and beginning and ending dates for construction of different sections of separation barrier, generously provided to us by Maj. Gen. (ret.) Netzach Mashiach of the IDF. On the basis of these dates and locations, we linearly interpolated the daily growth in length of the barrier. A similar barrier surrounding Gaza was completed in 1994, prior to the beginning of the Second Intifada.

PREVALENCE OF SUICIDE ATTACKS AND TARGETED KILLINGS

During the Second Intifada, suicide attacks became the primary method used by the violent Palestinian factions. In Table 1 we present tabulations of the number of Israeli fatalities during each year of the conflict (until 15 January 2005) as well as the share of those fatalities that occurred as a result of a suicide attack. This share shows a clear increase from 0 to 0.688 between 2000 and 2003. In 2004, both the number of overall Israeli deaths declined, as well as the share due to suicide attacks. Nevertheless, it is clear that as the Intifada progressed, suicide bombings became the prevalent means by which the Palestinians attacked Israelis.[10]

[10] Israeli fatalities declined sharply after the end of our sample period. There were 23 Israeli fatalities from suicide bombings in the remainder of 2005 (or 58% of all Israeli fatalities in that year), 13 in 2006 (54% of all Israeli fatalities), and 3 fatalities in 2007 (50% of all Israeli fatalities).

Table 1. Israeli fatalities in the second intifada, 29 September 2000 to 15 January 2005.

	Year					
Variable	2000	2001	2002	2003	2004–2005	Total
Total Israeli fatalities	42	195	439	199	119	994
Israeli fatalities by suicide attacks	0	79	215	137	54	485
Share of Israeli fatalities by suicide attacks	0.000	0.405	0.490	0.688	0.454	0.488
Number of successful suicide attacks	0	11	32	16	8	67
Number of unsuccessful suicide attacks	2	14	26	6	8	56
Share of attacks that were successful	0.000	0.440	0.552	0.727	0.500	0.545
Average number of fatalities per successful suicide attack	—	7.2	6.7	8.6	6.8	7.2
Average number of fatalities per all suicide attacks	0.0	3.2	3.7	6.2	3.4	3.9

Source: Authors' calculations from B'Tselem data.

The fourth and fifth rows show the number successful and unsuccessful suicide attacks. The rise and then decline in the share of Israeli deaths due to suicide attacks are due both to the number and the "efficiency" of those attacks. The last three rows of Table 1 show the average share of suicide attacks resulting in Israeli fatalities, and the number of Israeli deaths per successful and total attacks, measures of the "efficiency" of suicide attacks. The number of overall Israeli fatalities and the share due to suicide attacks declined after 2003. This may indicate a shift in Palestinian methods or (more likely) an increase in Israel's ability to detect and deter Palestinian attacks.

The time-series pattern of targeted killings shows similar, although not identical trends. In Table 2 we present tabulations of the prevalence of targeted killings among Palestinian fatalities using both B'Tselem data on targeted killings that resulted in at least one fatality, as well as data from Zussman and Zussman (2006), which also include targeted killings that may not have resulted in any fatalities. The results from the two datasets are generally consistent, showing a substantial increase in the share of targeted killings in Palestinian fatalities: this share rises from about 5% in 2001 to about 15% in 2004. The two datasets differ, however, in the share of collateral fatalities in targeted killings, with the B'Tselem data showing that about 38% of the fatalities in targeted killings were not the targets themselves while the Zussman and Zussman show 59% of the fatalities in targeted killings were not the intended target. The two datasets also differ

in the number of targeted killings, with Zussman and Zussman showing substantially more, particularly in 2002 and 2003.[11]

The last two rows of each panel in Table 2 show measures of Israeli efficiency in targeted killings. On average during the conflict, by both measures, Israel was successful more than 80% of the time in killing the targeted individual. The average number of individuals reported killed in a targeted killing attempt increased from about 1.5 in 2000–2001 to about 3.5–4.0 in 2004, depending on the data source.

ISRAELI REACTION TO SUICIDE ATTACKS AND OTHER PALESTINIAN VIOLENCE

We turn now to estimating Israel's the response to suicide attacks. We estimate the model:

$$\begin{aligned} P_t^{all} = {} & \alpha + \beta_1 I_{t-1}^{s} + \beta_2 I_{t-2}^{s} + \gamma_1 I_{t-1}^{u} + \gamma_2 I_{t-2}^{u} \\ & + \delta_1 I_{t-1}^{oth} + \delta_2 I_{t-2}^{oth} + \rho_1 P_{t-1}^{all} + \rho_2 P_{t-2}^{all} + \mathbf{X'}_t \Theta + \varepsilon_t, \end{aligned} \tag{2}$$

where P_t^{all} is a measure of total Palestinian fatalities in period t; I_t^s is the number of successful (i.e., causing Israeli fatalities) suicide attacks in period t; I_t^u is the number of unsuccessful (i.e., not causing Israeli fatalities) suicide attacks in period t; I_t^{oth} is the number Israeli fatalities not due to suicide attacks in period t; $\mathbf{X}_t$ is a vector of variables controlling for the different periods in the conflict as well as the length of the West Bank separation barrier, and ε_t is a random error term capturing non-systematic determinants of the number of Palestinian fatalities in period t. We define the variables I_t^s and I_t^u so that they are in the same metric (number of attacks) to facilitate comparison of the magnitude of the estimated coefficients. The β and γ coefficients measure Israel's response to the occurrence of successful and unsuccessful suicide attacks, respectively, in terms of the subsequent changes in Palestinian fatalities.[12] For ease of interpretation of the coefficients, we estimate all our equations using a linear model, even though the dependent variable is a count variable, which takes on only non-negative discrete values. Standard errors are always made robust to heteroskedasticity. None of our results are substantively affected if we estimate our model using Poisson, negative binomial, or zero-inflated Poisson regressions.

We estimate Equation (1) via ordinary least squares (OLS) and use the number of total Palestinian fatalities in week t as our primary measure of P_t^{all}. OLS will estimate the causal effect of the independent variables on P_t^{all} if they are orthogonal to ε_t. A

[11] Part of the discrepancy between the two definitions of targeted killings may be due to the fact that Zussman and Zussman included in their count fatalities that resulted from military operations where the intention at the onset was only to capture a specific suspect, but that ended with a gunfight and the killing of the suspect.

[12] We have also experimented with different lag structures, and all the results remain essentially unchanged. Jaeger and Paserman (2008) examine the lag structure of the dynamic of overall fatalities in detail and conclude that it is only the first two weeks after an Israeli or Palestinian fatality that are relevant to subsequent violence.

Table 2. Palestinian fatalities in the second intifada, 29 September 2000 to 30 April 2004.

Variable	Year					Total
	2000	2001	2002	2003	2004	
Total Palestinian fatalities (B'Tselem)	286	470	1,038	587	216	2,597
B'Tselem Definition						
Palestinians "targets" killed in targeted killings	9	39	38	45	18	149
Other Palestinians killed in targeted killings	6	7	26	43	10	92
Total Palestinians killed in targeted killings	15	46	64	88	28	241
Share of total Palestinian fatalities in targeted killings	0.052	0.098	0.062	0.150	0.130	0.093
Number of successful targeted killings	9	24	19	24	6	82
Number of unsuccessful targeted killings	0	9	2	7	1	19
Share of targeted killings that were successful	1.000	0.727	0.905	0.774	0.857	0.812
Average number of fatalities per targeted killing	1.7	1.4	3.0	2.8	4.0	2.4
Zussman and Zussman Definition						
Palestinians "targets" killed in targeted killings	9	29	45	32	16	131
Other Palestinians killed in targeted killings	6	26	74	64	16	186
Total Palestinians killed in targeted killings	15	55	119	96	32	317
Share of total Palestinian fatalities in targeted killings	0.052	0.117	0.115	0.164	0.148	0.122
Number of successful targeted killings	10	30	50	36	8	134
Number of unsuccessful targeted killings	0	10	5	8	1	24
Share of targeted killings that were successful	1.000	0.750	0.909	0.818	0.889	0.848
Average number of fatalities per targeted killing	1.5	1.4	2.2	2.2	3.6	2.0

Note: Successful targeted killings are those in which the targeted individual was killed. Unsuccessful targeted killings are those in which the targeted individual was not killed.
Source: Authors' calculations from B'Tselem and Zussman and Zussman (2006) data.

potential violation of our identifying assumption would occur if the total number of attacks (both successful and unsuccessful) was correlated with unobserved determinants of Palestinian violence. For example, it could be that in periods when the overall intensity of the conflict is high, there are both a high number of Palestinian attacks and a high number of Israeli fatalities, inducing a spurious positive correlation between Palestinian attacks and subsequent Israeli fatalities. It is for this reason that our regressions include

a large number of additional control variables, such as lagged numbers of Palestinian fatalities, lagged number of Israeli fatalities in non-suicide attacks, period dummies, and the length of the separation barrier.

If the total number of suicide attacks is uncorrelated with the error term (conditional on the overall intensity of the conflict), then we are quite confident that we can attribute a causal interpretation to our coefficients on the number of successful and unsuccessful attacks. The reason for this is that conditional on the total number of attacks, the number of successful attacks is as good as random. Whether an attack is successful or not (in terms of Israeli fatalities) is at least partially a function of chance — as shown in Table 1, just over half of suicide attacks were successful.

A potential additional source of concern is reverse causality. This may arise if Israel increases its level of vigilance in anticipation of its attacking the Palestinians. If this were the case, then the OLS estimates of β and γ would be downward biased and even potentially negative. Our estimated coefficients should therefore be taken as lower bounds of the true effects.[13] We are fairly confident, however, that the most plausible interpretation of our regression is a causal one, even though in the absence of a true or natural experiment it may be impossible to refute incontrovertibly alternative interpretations.

In Table 3 we present results from estimating Equation (1) using data from B'Tselem for the period 29 September 2000 to 15 January 2005. The first two columns present the coefficients and standard errors of our basic specification, where the dependent variable is the total number of Palestinian fatalities. We find that a successful suicide attack in week $t - 1$ on average leads to approximately 6.7 more Palestinian fatalities in week t; we can reject the null hypothesis that this coefficient is equal to zero at the 5% level. We can also reject the null that the coefficients on the number of successful suicide attacks are jointly equal to zero (at the 10% level). Consistent with the results in Jaeger and Paserman (2006a, b), we find that Israel reacts in a significant and positive way to fatalities in period $t - 1$ that are not caused by a suicide attack, and we can reject the null hypothesis that both coefficients on other Israeli fatalities are jointly equal to zero.[14] Neither of the coefficients on failed suicide attacks are statistically significantly different from zero at conventional levels. They are also not jointly different from zero.[15]

We also analyze the effect of suicide attacks on Palestinian fatalities in targeted killings, rather than on the total number of Palestinian fatalities. This allows us to shed light

---

[13] Alternatively, the estimated coefficients could be biased toward zero if the Palestinians could successfully implement preventive measures after a fatal suicide attack. Given the technology available to the two sides, we view this scenario as fairly implausible.

[14] This test is similar to that proposed by Granger (1969) and can be interpreted as a test of causality as long as the orthogonality assumption between the error term and the regressors is met.

[15] Suggestive evidence that omitted variable bias is not important comes from the fact that the key coefficient of interest in Table 3 is not affected by inclusion of additional control variables, beyond the control for lagged Israeli fatalities. Without any controls, the coefficient on lagged successful attacks is equal to 7.64 (with a standard error of 3.75). Including only one lag of other Israeli fatalities lowers the coefficient to 6.23 (with a standard error of 3.43), but addition of further controls does not change the coefficient substantially. This is evidence that the lag of other Israeli fatalities is already doing a good job of controlling for the other unobservables that may be correlated with the overall intensity of the conflict.

Table 3. Israeli reaction function: Reaction to successful and unsuccessful suicide attacks (weekly frequency).

	Total Palestinian Fatalities		Palestinian Fatalities in Targeted Killings	
Covariate	Coefficient	Std. Err.	Coefficient	Std. Err.
Number of successful suicide attacks				
One week prior	6.667	3.230	0.982	0.432
Two weeks prior	0.591	1.788	0.251	0.396
Number of failed suicide attacks				
One week prior	−0.326	1.765	−0.229	0.308
Two weeks prior	5.793	3.800	−0.303	0.244
Number of other Israeli fatalities				
One week prior	1.370	0.497	0.065	0.076
Two weeks prior	−0.263	0.444	−0.055	0.047
Number of Palestinian fatalities				
One week prior	0.093	0.102	−0.021	0.010
Two weeks prior	−0.017	0.101	−0.008	0.011
Periods				
Barak–Sharon	ref.		ref.	
Sharon-9/11	−9.119	3.673	−0.230	0.531
9/12-ODS	−2.302	4.367	0.136	0.559
ODS-Roadmap	−4.164	5.807	−0.022	0.898
Roadmap-Ceasefire	−4.993	3.715	0.447	0.685
Ceasefire	−22.504	7.467	−2.911	2.235
Post-Ceasefire	−20.472	11.511	−3.178	4.078
Length of Separation Barrier (10 km)	0.117	0.066	0.020	0.024
Constant	10.651	3.388	1.239	0.469
χ^2 for sig. of successful attempts (p-value)	4.76	(0.093)	5.18	(0.075)
χ^2 for sig. of failed attempts (p-value)	2.33	(0.312)	1.68	(0.431)
χ^2 for sig. of other fatalities (p-value)	7.83	(0.020)	2.52	(0.284)
R^2	0.336		0.071	

Note: Dependent variable is weekly number of Palestinian fatalities. Estimated with ordinary least squares with heteroskedasticity-consistent standard errors. Sample size is 225 weeks.
Source: Authors' tabulations of data from B'Tselem from 29 September 2000 to 15 January 2005.

on the hypothesis that suicide attacks and targeted killings are linked to each other in an unending causal loop (Bloom, 2004). Moreover, fatalities in targeted killings are the outcome of a deliberate action initiated by Israel (as opposed to other Palestinian fatalities, that may occur as a result of violence initiated by the Palestinians themselves), and therefore are more directly informative about Israel's strategic reaction to Palestinian violence. In the second two columns of Table 3 we present the estimated coefficients and standard errors of Equation (1), where the dependent variable is the number of Palestinians killed in targeted killings (both targets and bystanders). The results are very

similar to those obtained with total Palestinian fatalities on the left-hand side: Israel reacts systematically to suicide attacks by intensifying its use of targeted killings in the first week after a successful Palestinian attack (the coefficient is positive and statistically significant); on the other hand, there is no reaction to failed suicide attacks, and contrary to the previous specification, there is no evidence that Israel carries out more targeted killings in response to other Israeli fatalities.

The results in Table 3 provide strong evidence that Israel reacts to *realized* violence but not to intended violence that does not lead to a fatality.[16] If intended but unrealized suicide attacks revealed some information about future Palestinian terrorist activities, we would have expected to see a reaction to this type of violence as well. Since this is not the case, we are inclined to believe, as David (2002) asserts, that the primary motivation for the Israeli reaction is to satisfy the public's desire to dispense retribution to the Palestinians.[17]

PALESTINIAN REACTION TO TARGETED KILLINGS

We define the Palestinian reaction function in a way similar to that for the Israelis. We estimate the model:

$$\begin{aligned} I_t^{all} &= a + b_1 P_{t-1}^{s} + b_2 P_{t-2}^{s} + c_1 P_{t-1}^{u} + c_2 P_{t-2}^{u} \\ &\quad + d_1 P_{t-1}^{oth} + d_2 P_{t-2}^{oth} + \mathbf{X}'_t \Phi + \xi_t, \end{aligned} \tag{3}$$

where I_t^{all} is a measure of total Israeli fatalities in period t; P_t^s is the number of successful targeted killings in period t (i.e., those where the target was killed); P_t^u is the number of unsuccessful targeted killings in period t (i.e., where the target was not killed, although there could have been other individuals killed during the action); P_t^{oth} is the number of Palestinian fatalities not due to targeted killings in period t; $\mathbf{X}_t$ is defined as above; and ξ_t is a random error term capturing non-systematic determinants of the number of Israeli fatalities in period t. We discuss later the conditions under which the coefficients in this regression can be given a causal interpretation.

---

[16] In a previous version of this paper (Jaeger and Paserman, 2007), we checked the robustness of the results in Table 3 using a variety of different specifications for the dependent variable (logs rather than levels, or simply a dummy for whether there were any Palestinian fatalities), and aggregating the data at the daily rather than weekly level. Overall, we found that the results are not sensitive to the frequency at which we measure the outcomes nor to functional form. They strongly indicate that fatal suicide attacks lead to subsequent escalations in Israeli violence against Palestinians.

[17] Some recent studies provide empirical support to the notion that violence radicalizes the victimized population: Berrebi and Klor (2008) document that Israeli voters are more likely to vote for right-wing parties in response to Palestinian terrorist attacks, even though Gould and Klor (2009) argue that this rightward shift in the political map is accompanied by an increase in the support for territorial concessions to the Palestinians. On the other hand, Jaeger *et al.* (2009) find that violence against Palestinians leads to only a fleeting decrease in support for the moderate Fatah faction and for negotiations with Israel.

In Table 4 we present our baseline estimates of the Palestinian reaction function. The key explanatory variables are constructed from the B'Tselem data on targeted killings that resulted in a fatality, augmented with information from Zussman and Zussman (2006) on non-fatal targeted killings. The data cover the period from 29 September 2000 to 30 April 2004, when Zussman and Zussman's data end. The first two columns report the coefficients and standard errors with the total number of Israeli fatalities as

Table 4. Palestinian reaction functions: Reaction to successful and unsuccessful targeted killing attempts (weekly frequency).

	Total Israeli Fatalities		Israeli Fatalities in Suicide Attacks	
Covariate	Coefficient	Std. Err.	Coefficient	Std. Err.
Number of successful targeted killings				
One week prior	−1.120	0.449	−0.702	0.328
Two weeks prior	0.598	0.590	0.778	0.564
Number of failed targeted killings				
One week prior	−0.349	1.082	−0.139	0.877
Two weeks prior	−1.223	0.907	−0.720	0.747
Number of other Palestinian fatalities				
One week prior	0.095	0.045	0.043	0.027
Two weeks prior	0.014	0.073	0.029	0.057
Number of Israeli fatalities				
One week prior	0.038	0.092	−0.019	0.070
Two weeks prior	0.018	0.078	−0.053	0.063
Periods				
Barak–Sharon	ref.		ref.	
Sharon-9/11	2.631	1.404	2.567	1.134
9/12-ODS	4.813	1.905	3.496	1.348
ODS-Roadmap	6.975	3.189	7.297	2.701
Roadmap-Ceasefire	2.377	1.229	2.691	1.026
Ceasefire	2.783	4.970	3.911	4.215
Post-Ceasefire	1.336	8.798	1.993	7.661
Length of Separation Barrier (10 km)	−0.003	0.054	0.004	0.047
Constant	1.056	1.145	−0.915	0.827
χ^2 for sig. of successful attempts (p-value)	8.02	(0.018)	6.91	(0.032)
χ^2 for sig. of failed attempts (p-value)	1.88	(0.391)	1.01	(0.604)
χ^2 for sig. of other fatalities (p-value)	5.16	(0.076)	3.70	(0.157)
R^2	0.181		0.124	

Note: Dependent variable is weekly number of Israeli fatalities. Estimated with ordinary least squares. Successful targeted killings are those in which the targeted individual was killed. Unsuccessful targeted killings are those in which the targeted individual was not killed. Sample size is 189 weeks.
Source: Authors' tabulations of data from B'Tselem and Zussman and Zussman (2006) from 29 September 2000 to 30 April 2004.

the dependent variable. We find that there is a statistically significant negative effect of successful targeted killings on Israeli fatalities in the first week's lag, indicating that killing militants in one of the violent Palestinian factions have an incapacitation or deterrent effect. As for the effect of failed targeted killings on subsequent Israeli fatalities, we find that the coefficients on both lags are negative, but not statistically significant, either individually or jointly. In contrast to Jaeger and Paserman (2008), we find that the first lag of the number of other Palestinian fatalities raises the number of subsequent Israeli fatalities.[18] The next two columns in the table present the coefficients and standard errors for the model with the number of Israeli fatalities in suicide attacks as the dependent variable. The results are again very similar: the number of Israeli fatalities in suicide attacks falls in the first week after a successful targeted killing, and it appears to rise in the second week, but the coefficient is not statistically different from zero. Failed targeted killings and other Palestinian fatalities, on the other hand, have no effect on the number of Israeli fatalities in subsequent weeks.

Following Jaeger and Paserman (2007), we tested whether the results in Table 4 are robust to using alternative definitions of targeted killings (the augmented B'Tselem data as well as all of the Zussman and Zussman data), different frequencies (weekly and daily), and different functional forms for the dependent variable (levels and logs). The overall pattern of estimates of the Palestinian reaction function is somewhat nuanced, but the most consistent result is that successful targeted killings reduce the subsequent number of Israeli fatalities in the first week after the event.

THE TIMING OF THE PALESTINIAN RESPONSE AND ISRAELI VIGILANCE

The previous specification may be seen as restrictive, as we constrain the Palestinian response to occur in one of the first two weeks after a targeted killing. It is possible, however, that Palestinian militant organizations require more time for recruiting, training, and organizing an attack against Israeli targets. Similarly, it may be the case that Palestinians strategically choose not to respond immediately: by randomizing the timing of their response, they avoid being predictable and may therefore maximize the impact of their attack. In these two cases, we may not observe a delayed response to targeted killings, even if the immediate response is zero or even negative.

In Table 5, we test this hypothesis by regressing the number of Israeli fatalities on the number of successful targeted killings in the previous 1, 2, 4, 8, and 12 weeks. Each row of the table presents the coefficient from a separate regression. The first column uses the total number of Israeli fatalities as the dependent variable, while the second column uses only Israeli fatalities in suicide bombings. All regressions control for the same explanatory variables as in Equation (2). The first row essentially reproduces the results of Table 4: the number of Israeli fatalities (either in total or in suicide bombings

[18] This discrepancy may be due to the slightly different time period under examination, and in fact is not very robust to different specifications of the Palestinian reaction function, as seen below.

Table 5. Palestinian reaction functions: Robustness to different lag structures (weekly frequency).

	Total Israeli Fatalities		Israeli Fatalities in Suicide Attacks	
Covariate	Coefficient	Std. Err.	Coefficient	Std. Err.
Number of successful targeted killings				
One week prior	−1.121	0.448	−0.704	0.324
One to two weeks prior	−0.265	0.405	0.035	0.335
One to four weeks prior	0.000	0.249	0.063	0.207
One to eight weeks prior	0.043	0.265	0.130	0.248
One to twelve weeks prior	−0.292	0.224	−0.170	0.168

Note: Dependent variable is weekly number of Israeli fatalities. Estimated with ordinary least squares, standard errors adjusted for heteroskedasticity. Each row represents the coefficient from a separate regression. All regressions include two lags of unsuccessful targeted killings, two lags of Palestinian fatalities, two lags of Israeli fatalities, six time period dummies, and the length of the separation barrier. *Source*: Authors' tabulations of data from B'Tselem and Zussman and Zussman (2006) from 29 September 2000 to 30 April 2004.

only) is negatively correlated with the number of successful targeted killings in the previous week. On the other hand, the number of targeted killings aggregated over longer intervals is not related with subsequent Israeli fatalities. Overall, it appears that targeted killings lower Israeli fatalities only temporarily, and the Palestinians are quickly able to reorganize themselves and return to their usual level of activity. At the same time, there is no evidence that targeted killings *raise* the level of Palestinians violence, in contrast with the widely held notion of an interminable cycle of violence.[19]

At this point, we should note that our OLS strategy yields a consistent estimate of the parameters if the right-hand side variables in the model are uncorrelated with the error term ξ in Equation (2). The error term may be correlated with lagged values of Palestinian fatalities, however, if Israel is more likely to close its borders or increase its level of alertness following aggressive actions in the West Bank and Gaza. We can test this hypothesis directly by including the fraction of checkpoints that were completely closed as a measure of Israeli vigilance. This measure was constructed using daily reports from the United Nations Office for Coordination of Humanitarian Affairs (OCHA). Unfortunately, the measure is available only since October 2003, meaning that we lose a substantial fraction of our sample. Nonetheless, controlling for this measure of Israeli

[19] One possible explanation for the apparent lack of a systematic Palestinian response is the religious custom of observing 40 days of mourning before avenging deaths. Even though the number of Israeli fatalities is higher than average on exactly the 41st day after the occurrence of a targeted killing, this does not look in any way abnormal (the number of Israeli fatalities is also higher than average on the 15th, the 22nd, the 27th, and the 33rd day after the occurrence of a targeted killing).

vigilance has only a very minor effect on the other coefficients in the regression.[20] We are therefore reasonably confident that omitted variable bias is not an issue in our regressions. In the following section, we complement this analysis by exploring the determinants of *intended* Palestinian violence, which should be relatively less affected by Israeli vigilance.

To further probe whether the apparent suppressing effect of targeted killings on Palestinian violence is due to increased Israeli vigilance, or whether it captures a true incapacitation effect, we exploit the detailed geographic information available in our data. In particular, we recorded the Palestinian district in which each targeted killing occurred, as well as the district of origin of Palestinian attackers who caused Israeli fatalities. We then constructed a longitudinal dataset with information on the number of targeted killings and the number of Palestinian fatalities in each district and each week, and the number of Israeli fatalities (both in total and in suicide bombings) originating in each district. We then re-estimated Equation (2) using this longitudinal data, with the inclusion of district fixed effects to capture different levels of violence across districts that may be correlated with the intensity of Israeli military actions.

Columns 1 and 3 of Table 6 present the results of this estimation, for total Israeli fatalities and Israeli fatalities in suicide bombings, respectively. We find strong evidence that successful targeted killings in a particular district reduce the level of Palestinian violence originating from that district. Both lags of the number of successful targeted killings are strongly negative and statistically significant. This is consistent with the notion that targeted killings are effective in incapacitating potential attackers against Israeli targets. In columns 2 and 4, we add to the regression two lags of the number of targeted killings in all other Palestinian districts. If our results are entirely driven by increased Israeli vigilance, we would expect that the coefficient on this variable would be negative and significant, and would possibly reduce the coefficient on the number of targeted killings occurring in the district to zero. This is because Israel would probably raise its level of vigilance everywhere after a successful targeted killing, and not only in the district where the killing occurred. We do indeed find that the first lag of the number of targeted killings in all other districts is negative and significant, lending some support to the hypothesis of increased Israeli vigilance, but the coefficient is much smaller than the coefficient on the first lag of the number of targeted killings occurring in the district. As for the second lag, the number of targeted killings occurring in other districts is insignificant, while the number of targeted killings in the district is negative and strongly significant. Overall, the evidence strongly suggests that targeted killings are effective in incapacitating Palestinian militants, at least in the short run.

---

[20] These results are available from the authors by request. They are consistent with the results of Jaeger and Paserman (2008), who showed that even though Israeli vigilance at time t is related to both Israeli and Palestinian fatalities in the two weeks prior to t, inclusion of this measure in the Palestinian reaction function to all Palestinian fatalities has little effect on the estimated coefficients.

Table 6. Palestinian reaction functions at the district level: Reaction to successful and unsuccessful targeted killing attempts (weekly frequency).

	Total Israeli fatalities originating from district j		Total Israeli fatalities originating from district j		Israeli fatalities in suicide attacks originating from district j		Israeli fatalities in suicide attacks originating from district j	
Covariate	Coefficient	Std. Err.	Coefficient	Std. Err.	Coefficient	Std. Err.	Coefficient	Std. Err.
Number of successful targeted killings in district j								
One week prior	−0.191	0.085	−0.185	0.098	−0.110	0.053	−0.112	0.067
Two weeks prior	−0.257	0.098	−0.293	0.119	−0.155	0.046	−0.172	0.071
Number of successful targeted killings in all other districts								
One week prior			−0.058	0.022			−0.039	0.017
Two weeks prior			0.059	0.040			0.062	0.036
Number of failed targeted killings in district j								
One week prior	0.231	0.218	0.249	0.224	−0.052	0.062	−0.032	0.079
Two weeks prior	−0.082	0.114	−0.073	0.124	−0.023	0.060	−0.035	0.080
Number of failed targeted killings in all other districts								
One week prior			−0.012	0.058			−0.015	0.047
Two weeks prior			−0.018	0.060			0.002	0.053
R^2	0.043		0.045		0.023		0.025	

Note: The unit of observation is a district × week cell. Dependent variable is weekly number of Israeli fatalities. Estimated with ordinary least squares. Successful targeted killings are those in which the targeted individual was killed. Unsuccessful targeted killings are those in which the targeted individual was not killed. All regressions control also for two lags of total Israeli and Palestinian fatalities, for the length of the separation barrier, and for district fixed effects. Sample size is 3,024 (189 weeks × 16 districts).
Source: Authors' tabulations of data from B'Tselem and Zussman and Zussman (2006) from 29 September 2000 to 30 April 2004.

INTENDED PALESTINIAN VIOLENCE

The results of the last section suggest that successful targeted killings diminish subsequent Israeli fatalities. These results are not affected by the inclusion of a measure of Israeli preventive measures in the analysis, and the fact that violence originating in the district in which the targeted killing occurred indicates that targeted killings may have a true incapacitation effect. It is possible, however, that using *realized* violence understates the degree of Palestinian actions. To address this issue, we now consider *intended* Palestinian suicide attacks. We measure intended suicide attacks in two ways. First, we combine the B'Tselem measures used in Tables 3 and 4 on successful and unsuccessful suicide attacks into one measure of intended suicide attacks. This is a rather narrow definition in the sense that it only measures suicide attacks in which suicide bombers themselves were killed. It does not measure attacks in which the explosive device did not detonate or in which the attacker was apprehended before exploding his or her device. We therefore use a second, broader, but somewhat unclearly defined, measure from the IDF on "suicide bombings." This measure, according to the IDF, includes information on realized and prevented suicide attacks.[21] Unfortunately, these data are publicly available only at a monthly frequency.

In Table 7 we present regression results that mirror those in Table 4, except that the dependent variable is now the number of intended (total successful and unsuccessful) suicide attacks from the B'Tselem data, rather than all Israeli fatalities. We find little evidence that successful or unsuccessful targeted killings affect intended Palestinian suicide attacks. This suggests that the deterrence/incapacitation effect we found of targeted killings on the level of realized Israeli fatalities does not hold with respect to intended suicide attacks. We have also estimated a similar model using an indicator variable for any intended suicide attacks as the dependent variable, with similar results.[22]

The B'Tselem data on intended suicide attacks are, as noted above, somewhat limited in scope and likely miss some Palestinian actions. It is possible that with a broader measure of Palestinian intentions we would find different results. To explore this issue, we turn now to monthly frequency regressions and the IDF measure of intended suicide attacks. To this point in the analysis we have relied on a linear specification in the independent

---

[21] It appears that the IDF sometimes uses the terms "suicide attacks" and "terrorist attacks" interchangeably: see for example <http://www1.idf.il/dover/site/mainpage.asp?sl=EN&id=22&docid=16703> and <http://www1.idf.il/SIP_STORAGE/DOVER/files/6/31646.doc>. In an unusually detailed announcement released on December 25 2003 (<http://www1.idf.il/dover/site/mainpage.asp?clr=1&sl=HE&id=7&docid=26412>, in Hebrew), the IDF describes in detail 10 prominent "prevented attacks." These include the arrests of five suspected suicide bombers, four suspected drivers, four suspected planners of attacks against Israelis, and one militant suspected of acting as a liaison between the central command of the terrorist cell and the suspected suicide bomber. In at least one case, it is quite clear that the planned attack was *not* a suicide attack.

[22] Another possible interpretation of this finding is given by Benmelech *et al.* (2009), who highlight the importance of the quality of available operators for the success of suicide attacks. It is possible that the incapacitation effect is obtained by reducing the ability of terrorist organizations to recruit quality operatives.

Table 7. Palestinian reaction function, intended suicide attacks: Reaction to successful and unsuccessful targeted killings (weekly frequency)

Covariate	Coefficient	Std. Err.
Number of successful targeted killings		
One week prior	−0.088	0.083
Two weeks prior	0.084	0.102
Number of failed targeted killings		
One week prior	−0.058	0.156
Two weeks prior	−0.117	0.172
Number of other Palestinian fatalities		
One week prior	0.004	0.005
two weeks prior	0.005	0.009
Number of Israeli fatalities		
One week prior	0.003	0.014
Two weeks prior	0.010	0.013
Periods		
Barak–Sharon	ref.	
Sharon-9/11	0.413	0.207
9/12-ODS	0.979	0.280
ODS-Roadmap	1.128	0.579
Roadmap-Ceasefire	0.326	0.163
Ceasefire	−0.222	0.626
Post-Ceasefire	−0.978	1.004
Length of Separation Barrier (10 km)	0.008	0.006
Constant	−0.008	0.193
χ^2 for sig. of successful attempts (p-value)	1.95	(0.378)
χ^2 for sig. of failed attempts (p-value)	0.63	(0.730)
χ^2 for sig. of other fatalities (p-value)	0.80	(0.671)
R^2	0.190	

Note: Dependent variable is the number of days with total successful and failed suicide attacks. Estimated with ordinary least squares with heteroskedasticity-consistent standard errors. Successful targeted killings are those in which the targeted individual was killed. Unsuccessful targeted killings are those in which the targeted individual was not killed. Number of observations is 189 weeks.
Source: Authors' tabulations of data from B'Tselem and Zussman and Zussman (2006) from 29 September 2000 to 30 April 2004.

variables with two weeks of lags. There is evidence, however, that the relationship between targeted killings and intended violence is not linear at a monthly frequency. In Figure 1 we graph our two measures of intended suicide attacks (from B'Tselem and the IDF) against the number of successful targeted killings in the previous month. Figure 1 makes

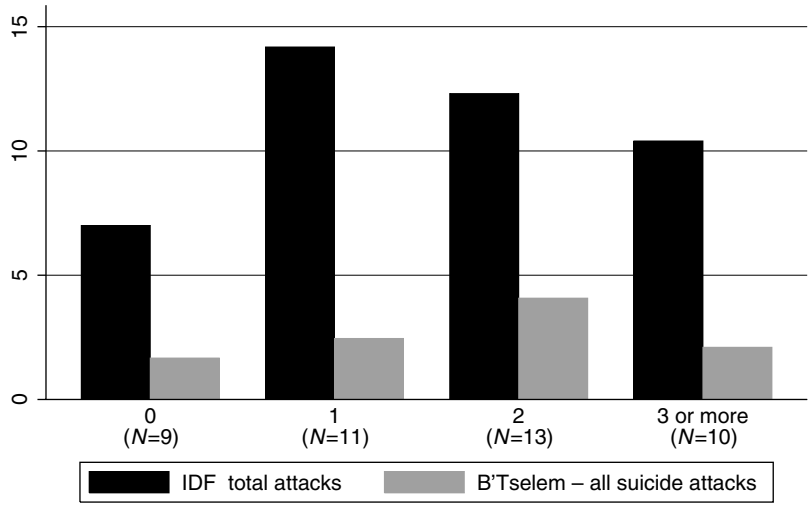

Figure 1. Total Palestinian attacks by number of successful targeted killings in previous month.
Source: Authors calculations based on data from B'Tselem, the IDF, and Zussman and Zussman (2006).

clear that one targeted killing increases the number of suicide attack attempts in the subsequent month, but that additional successful targeted killings reduce the number of suicide attack attempts, particularly with regard to the IDF data. On average, however, the months following those with targeted killings have more suicide attack attempts than those with no targeted killings. Regardless, Figure 1 suggests that a quadratic in targeted killings is likely to be an appropriate specification. Given the monthly frequency of the data and the limited number of observations at our disposal (42 months), we include only one lag of the targeted killing and other Palestinian fatality variables, but with a quadratic functional form.

In Table 8 we present results from regressions at a monthly frequency on realized and intended violence. In the first column the dependent variable is the B'Tselem measure of intended suicide attacks. We find that successful targeted killings have a statistically significant and positive relationship with intended suicide attacks. The results imply that intended suicide attacks rise up to 3 targeted killings in the previous month and then decline.[23] We find no statistically significant relationship between the other measures of Israeli violence (unsuccessful targeted killings and other Palestinian fatalities) and intended Palestinian attacks. In the second column of Table 8, we present results using the IDF measure of intended Palestinian attacks. These yields results that are qualitatively very similar to those using the B'Tselem measure. We again find a statistically significant

[23] The peak of the quadratic function is attained at $1.341/2 \times 0.226 = 2.97$ successful targeted killings.

Table 8. Palestinian reaction function, intended violence: Reaction to successful and unsuccessful assassination attempts (monthly frequency).

	Dependent variable: total sucessful and failed suicide attacks (B'Tselem)		Dependent variable: total successful and failed suicide attacks (IDF)	
Covariate	Coefficient	Std. Err.	Coefficient	Std. Err.
Number of successful targeted killings				
One month prior (linear)	1.341	0.670	2.796	1.190
One mont prior (quadratic)	−0.226	0.135	−0.431	0.222
Number of failed targeted killings				
One month prior (linear)	0.611	1.280	−1.407	3.061
One month prior (quadratic)	−0.332	0.492	0.778	1.088
Number of other Palestinian fatalities				
One month prior (linear)	−0.024	0.031	0.011	0.051
One month prior (quadratic)	0.00015	0.00011	−0.00003	0.00020
Number of Israeli fatalitites one month prior	−0.039	0.019	−0.092	0.035
Periods				
Barak–Sharon	ref.		ref.	
Sharon-9/11	0.853	1.055	0.474	1.934
9/12-ODS	5.081	2.036	7.066	3.071
ODS-Roadmap	4.407	0.871	13.814	1.669
Roadmap-Ceasefire	1.379	1.158	15.776	2.038
Ceasefire	1.704	3.553	18.380	8.900
Post-Ceasefire	−0.444	4.546	15.116	13.235
Length of Separation Barrier (10 km)	0.006	0.026	−0.023	0.079
Constant	1.243	1.215	0.845	2.111
R^2	0.510		0.749	

Note: All models estimated with ordinary least squares with heteroskedasticity-consistent standard errors. Successful targeted killings are those in which the targeted individual was killed. Unsuccessful targeted killings are those in which the targeted individual was not killed. Number of observations is 43 months.

Source: Authors' tabulations of data from B'Tselem, Zussman and Zussman (2006), and the IDF, from October 2000 to April 2004.

relationship between successful targeted killings and intended Palestinian violence. The results imply that intended Palestinian attacks peak when there are 3.2 successful targeted killings in the previous month.

One substantial difference between the two regressions is the pattern of coefficients on the period variables. Most notably, the number of total attacks according to IDF data starts at a relatively low level, jumps starkly at the time of Operation Defensive Shield, and then flattens out. This suggests that the IDF measure is, in part, affected by the level of intelligence gathering within the Occupied Territories and may not strictly reflect the evolution of intended Palestinian violence over time. We are therefore cautious about overinterpreting these results. Nevertheless, the remarkable consistency in the results on successful targeted killings between the B'Tselem and IDF data point, at the very least, in the direction that increased targeted killings may reduce subsequent levels of activity related to suicide attacks, although this effect occurs at levels of targeted killings that are almost never observed in the data.[24]

It is worth commenting on the differences between these results and those in Jaeger and Paserman (2008). There we found that Israeli violence does not cause a significant Palestinian response in terms of realized violence. This result is essentially replicated in our results regarding non-targeted killing fatalities (which are about 85% of total Palestinian fatalities) in most of our regressions, although we do find a statistically significant effect in some of our models.[25] It is primarily the deaths of Palestinian leaders from targeted killings that appear to affect the Palestinian response. In the case of realized Palestinian violence (i.e., the regressions in which we use total Israeli fatalities as the dependent variable), we find a deterrent effect of successful targeted killings. In the case of intended violence (i.e., the regressions where we used intended suicide attacks), we find some evidence of an inverted-U shaped relationship with targeted killings, suggesting that at low levels of targeted killings the vengeance factor dominates and Palestinians are driven to intensify their efforts to respond violently; at higher levels, however, the incapacitation or deterrent effect dominates, and the overall level of Palestinian violence diminishes.

DISCUSSION AND CONCLUSION

Are targeted killings effective in reducing the level of Palestinian violence? The evidence presented here suggests that there may be a short-term incapacitation or deterrent effect of targeted killings in terms of *realized* Palestinian violence. We find little evidence to

[24] Relative to months in which there were no successful targeted killings, the results suggest that suicide attacks would decline when there are at least 5.9 successful targeted killings. There are only four months in the data in which we observe five or more successful targeted killings.

[25] Because our data on targeted killings are limited to the time period covered by Zussman and Zussman (2006), our results here cover a different period than in Jaeger and Paserman (2008). When we limit ourselves to using only the data from B'Tselem and examine the entire period covered by Jaeger and Paserman (2008), the coefficients on other Palestinian fatalities in the Palestinian reaction function are no longer statistically significant.

suggest, however, that this reduction occurs because of a decrease in the level of terrorist activity. When we examine how targeted killings affect *intended* violence, we find that at low levels, targeted killings actually increase the Palestinian efforts to respond with suicide attacks. Our results suggest that higher numbers of targeted killings perhaps lead to a reduction in subsequent intended Palestinian suicide attacks, but only at a level that has been rarely, if ever, observed during the Second Intifada.

Do suicide attacks affect subsequent Israeli violence? Our results consistently indicate that suicide attacks lead to increased levels of subsequent Palestinian fatalities. Israel clearly responds to both suicide attacks and other Israeli fatalities with lethal force in a regular and predictable way, with each successful suicide attack leading to approximately seven additional Palestinian deaths, and each Israeli death caused by other means leading to about one additional Palestinian death. We find no evidence that Israel reacts to failed suicide attacks.

We do not find strong support for Bloom's (2004, 2005) assertion that suicide attacks and targeted killings follow a never-ending "tit-for-tat" pattern. Israel clearly reacts to suicide attacks, but targeted killings would appear to *reduce* subsequent Israeli fatalities. We do present suggestive evidence that targeted killings lead to elevated Palestinian activity related to suicide attacks (as measured by the IDF data on intended suicide attacks), but this activity does not seem to lead to increased levels of Israeli fatalities.

Our findings are consistent with the theory of Bueno de Mesquita and Dickson (2007), who hypothesize that one of the purposes of suicide attacks is to provoke a counterterrorism response that will radicalize the Palestinian population. Even though we cannot test directly the effects of targeted killings on the support for different Palestinian factions (see Jaeger *et al.*, 2009) the apparent increase in intended suicide attacks following Israeli targeted killings suggests that some increase in support for militant factions may indeed have occurred. Indirectly, our results also support the theory of Kydd and Walter (2002): the fact that the Israeli response seems to be at least in part driven by a revenge motive is consistent with the hypothesis that suicide attacks serve the purpose of derailing the peace process by affecting the views of the Israeli public.

Our results address the short-term effects of suicide attacks and targeted killings on subsequent violence. But are these policies effective in realizing the long-term goals of the Palestinians and Israelis? Here, of course, we do not have recourse to regression analysis and can only speculate about the longer-term effect of violence. On one hand, we note that the Palestinian leadership has been nearly entirely decapitated as a result of Israel's policy of targeted killings. If a leader's charisma and authority are required to induce the Palestinian population to make painful concessions, achieving a negotiated settlement in the future may now prove to be more difficult. Evaluating the strategic effectiveness of terrorist campaigns, and the measures taken to combat them, should likely take this into account as well.

On the other hand, one of the long-term goals of the Palestinians is withdrawal of Israeli settlements and troops from the Occupied Territories (Pape, 2005). In the summer of 2005, the Israeli government unilaterally withdrew from the Gaza Strip, evacuating all settlements there. Between 2000 and 2007, the Jewish population in the West Bank grew at an annual rate of 6.3%, a substantial slowdown relative to the 9.9% rate of

the 1993-2000 period.[26] These outcomes, while not necessarily solely a product of the suicide terror campaign during the Second Intifada, do suggest that Palestinian violence, and in particular suicide attacks, can have an influence on Israeli policies, even at a cost of thousands of Palestinian and hundreds of Israeli lives.

On the Israeli side, the level of Palestinian violence against Israelis has decreased substantially since the beginning of the Intifada. This is likely due, in part, to the increased use of targeted killings coupled with increasing restrictions on movement between the Occupied Territories and Israel (e.g., the separation barrier) and vigilance. Given the relative long-term successes of the policies of suicide attacks and targeted killings (coupled with other deterrent policies), current and future conflicts with similar asymmetries in military power between the occupying and occupied populations may see continued use of these strategies.

REFERENCES

Ashworth, S., J. D. Clinton, A. Meirowitz, and K. W. Ramsay. 2008. "Design, Inference, and the Strategic Logic of Suicide Terrorism." *American Political Science Review* 102(2): 269–273.

Benmelech, E. and C. Berrebi. 2007. "Human Capital and the Productivity of Suicide Bombers." *Journal of Economic Perspectives* 21(3): 223–238.

Benmelech, E., C. Berrebi, and E. Klor. 2009. "Economic Conditions and the Quality of Suicide Terrorism." Unpublished manuscript, Harvard University.

Berrebi, C. and E. F. Klor. 2006. "On Terrorism and Electoral Outcomes: Theory and Evidence from the Israeli–Palestinian Conflict." *Journal of Conflict Resolution* 50(6): 899–925.

Berrebi, C. and E. F. Klor. 2008. "Are Voters Sensitive to Terrorism? Direct Evidence from the Israeli Electorate." *American Political Science Review* 102(3): 279–301.

Bloom, M. M. 2004. "Palestinian Suicide Bombing: Public Support, Market Share and Outbidding." *Political Science Quarterly* 119(1): 61–88.

Bloom, M. M. 2005. *Dying to Kill: The Allure of Suicide Terror*. New York: Columbia University Press.

Brophy-Baermann, B. and J. A. C. Conybeare. 1994. "Retaliating Against Terrorism: Rational Expectations and the Optimality of Rules versus Discretion." *American Journal of Political Science* 38(1): 196–210.

Bueno de Mesquita, E. and E. S. Dickson. 2007. "The Propaganda of the Deed: Terrorism, Counterterrorism, and Mobilization." *American Journal of Political Science* 51(2): 364–381.

Byman, D. 2006. "Do Targeted Killings Work?" *Foreign Affairs* 85(2): 95–111.

David, S. R. 2002. "Israel's Policy of Targeted Killing." *Ethics and International Affairs* 17(1): 111–126.

Enders, W. and T. Sandler. 1993. "The Effectiveness of Antiterrorism Policies: A Vector-Autoregression-Intervention Analysis." *American Political Science Review* 87(4): 829–844.

Frisch, H. 2006. "Motivation or Capabilities? Israeli Counterterrorism against Palestinian Suicide Bombings and Violence." *Journal of Strategic Studies* 29(5): 843–869.

Gould, E. D. and E. F. Klor. 2009. "Does Terrorism Work?" Unpublished manuscript, Hebrew University.

Granger, C. W. J. 1969. "Investigating Causal Relations by Econometric Methods and Cross-Spectral Methods." *Econometrica* 37(3): 424–438.

---

[26] *Source*: Israel Central Bureau of Statistics, *Statistical Abstracts of Israel*, various issues. The numbers do not include residents of Jewish neighborhoods in East Jerusalem. The slowdown in population growth in the West Bank was much larger, in both absolute and relative terms, relative to the slowdown in population growth in the rest of Israel.

Gupta, D. K. and K. Mundra. 2005. "Suicide Bombings as a Strategic Weapon: An Empirical Investigation of Hamas and Islamic Jihad." *Terrorism and Political Violence* 17(2): 573–598.
Jacobson, D. and E. H. Kaplan. 2007. "Suicide Bombings and Targeted Killings in (Counter-)Terror Games." *Journal of Conflict Resolution* 51(5): 772–792.
Jaeger, D. A., E. F. Klor, S. Miaari, and M. D. Paserman. 2009. "The Struggle for Palestinian Hearts and Minds: Violence and Public Opinion in the Second Intifada." Unpublished Manuscript, Boston University.
Jaeger, D. A. and M. D. Paserman, 2006a. "Israel, the Palestinian Factions and the Cycle of Violence." *American Economic Review* 96(2): 45–49.
Jaeger, D. A. and M. D. Paserman. 2006b. "The Cycle of Violence? An Empirical Analysis of Fatalities in the Palestinian-Israeli Conflict." IZA Discussion Paper 1808, February.
Jaeger, D. A. and M. D. Paserman. 2007. "The Shape of Things to Come? Assessing the Effectiveness of Suicide Attacks and Targeted Killings." IZA Discussion Paper 2890, June.
Jaeger, D. A. and M. D. Paserman. 2008. "The Cycle of Violence? An Empirical Analysis of Fatalities in the Palestinian-Israeli Conflict." *American Economic Review* 98(4): 1591–1604.
Kaplan, E. 2006. "Backgrounder: Targeted Killlings." Council on Foreign Relations, <http://www.cfr.org/publication/9627/> (last see 11 June 2007).
Kaplan, E. H., A. Mintz, and S. Mishal. 2006. "Tactical Prevention of Suicide Bombings in Israeli." *Interfaces* 36(6): 553–561.
Kaplan, E. H., A. Mintz, S. Mishal, and C. Samban. 2005. "What Happened to Suicide Bombings in Israel? Insights from a Terror Stock Model." *Studies in Conflict and Terrorism* 28(2): 225–235.
Kydd, H. A. and B. F. Walter. 2002. "Sabotaging the Peace: The Politics of Extremist Violence." *International Organizations* 56(2): 263–296.
Pape, R. A. 2003. "The Strategic Logic of Suicide Terrorism." *American Political Science Review* 97(3): 1–19.
Pape, R. A. 2005. *Dying to Win: The Strategic Logic of Suicide Terrorism*. New York: Random House Trade Paperbacks.
Pape, R. A. 2008. "Methods and Findings in the Study of Suicide Terrorism." *American Political Science Review* 102(2): 275–277.
Stein, Y. 2003. "By Any Name Illegal and Immoral." *Ethics and Internatioanl Affairs* 17(1): 127–137.
White, H. 1980. "A Heteroskedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroskedasticity." *Econometrica* 48(4): 817–838.
Zussman, A. and N. Zussman. 2006. "Assassinations: Evaluating the Effectiveness of a Counterterrorism Policy." *Journal of Economic Perspectives* 20(2): 193–206.